

AS/400



AS/400 Guide to Advanced Function Presentation and Print Services Facility

AS/400



AS/400 Guide to Advanced Function Presentation and Print Services Facility

Note!

Before using this information and the product it supports, be sure to read the general information in "Notices" on page xvii.

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Lotus 123
Microsoft Windows
Microsoft, Inc.
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PostScript
The Font Company
Transform/400
Windows
WordPerfect
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Preface

This publication provides information about using the IBM Print Services Facility feature of OS/400 (PSF/400) and is written for the general AFP user as well as for system and application programmers.

This publication helps you learn Advanced Function Presentation (AFP) and develop AFP applications. It parallels the AS/400 Advanced Function Presentation course and builds skills chapter by chapter. The first chapters set the stage for print and presentation on AS/400, covering the value of AFP applications, the AS/400 print flow, AS/400 AFP architecture and flow, and related applications. These chapters cover the two major aspects of AFP, the document architecture and the printing architecture.

“Chapter 5. Introduction to the Super Sun Seeds Case Study” on page 43 presents a sample invoicing application used throughout the publication. Subsequent chapters cover the building blocks of electronic publications: fonts, image and graphics, bar codes, and electronic forms. A series of “Using” chapters describes how to use different AS/400 application enablers to create the Super Sun Seeds invoicing application.

“Chapter 16. Using the Client Access/400 AFP Viewer” on page 233 shows how to view electronic applications, in addition to (or in place of) printing them.

“Chapter 17. Using Facsimile Support, OfficeVision, and OnDemand for AS/400” on page 241 demonstrates how several AS/400 applications integrate with, and complement, the example AFP application. In addition, the publication includes chapters on network and cross-system considerations, and the appendices provide both additional examples and reference information.

Note: For more information about AFP for PSF/400, consult the IBM Printing Systems home page:

<http://www.printers.ibm.com>

Chapter 1. How AFP and PSF/400 Can Help You Present Information

Advanced Function Presentation (AFP) is a printing and presentation system that enables you to take full advantage of printing technology on your AS/400 system. AFP helps you combine the capabilities of high-function Intelligent Print Data Stream (IPDS) printers and print software to:

- Create state-of-the-art documents
- Exploit print formatting capabilities without changing application programs
- Replace traditional, labor-intensive print operations with a system-managed process
- Print with complete system management and full error recovery, whether the printer is system-attached via twinax or network-attached via TCP/IP.

PSF/400 is the AFP system software for AS/400 printers using the IPDS printer data stream. PSF/400 enables AS/400 users and applications to take full advantage of IPDS printer capabilities.

AFP provides a number of capabilities that can improve your current printing process. With AFP, you can:

Create your own forms in-house. This allows you to improve the flexibility and quality of your forms, avoid the expense of having someone create them for you, and avoid the inventory problems associated with preprinted forms (form obsolescence, storage, handling).

The diagram illustrates the conversion of a traditional form into a more structured, table-based layout. On the left, a traditional form titled "ROCK SOLID CORPORATION BALANCE SHEET" is shown. It contains various fields and sections. An arrow points from this form to a more structured version on the right, titled "ROCK SOLID CORPORATION RS". This version uses a table to organize the data.

Balance Sheet			
Assets	Total Current Assets	Total Current Liabilities	Shareholders' Equity
January	27,214	44,474	144,055
February	45,888	43,476	47,243
March	37,440	47,400	124,342
April	32,427	46,912	112,345
TOTAL	143,169	182,262	428,000

Create your own bar codes. This allows you to automate your business processes, improve data entry accuracy and speed, and meet industry requirements for bar codes.



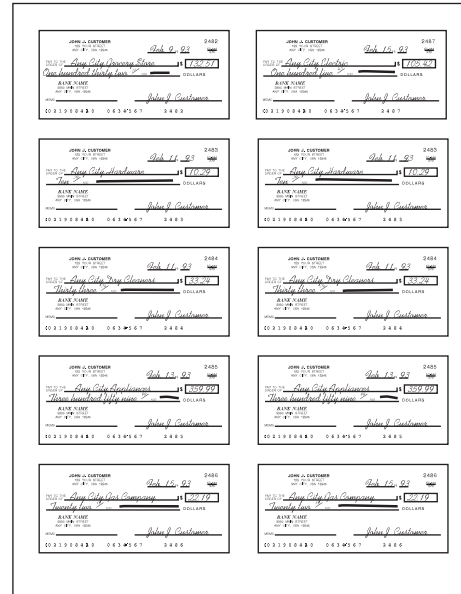
The image is a composite of three financial-related graphics. At the top left is a 'ROCK SOLID CORPORATION BALANCE SHEET' with columns for JANUARY, FEBRUARY, MARCH, and APRIL. It lists 'Total Current Assets' and 'Total Current Liabilities'. Below this is a 'Rock Solid Corporation Quarterly Report' featuring a bar chart with four bars of varying heights and a line graph. To the right of the report is a 'Stockholders Equity' pie chart divided into five segments of different shades of gray. A large, thick, grey arrow points from the financial statement area towards the bar chart.

	JANUARY	FEBRUARY	MARCH	APRIL
Total Current Assets	10,000	10,000	10,000	10,000
Total Current Liabilities	10,000	10,000	10,000	10,000

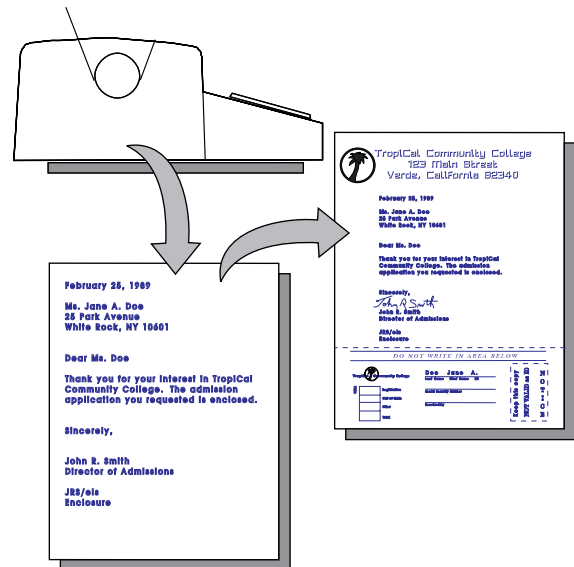
	Quarter 1	Quarter 2	Quarter 3	Quarter 4
Revenue	10,000	10,000	10,000	10,000
Expenses	10,000	10,000	10,000	10,000

Category	Value
Common Stock	10,000
Preferred Stock	10,000
Retained Earnings	10,000
Accumulated Depreciation	10,000
Other	10,000

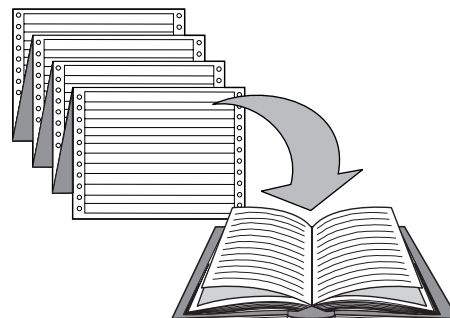
Include scanned images of transaction items such as cancelled checks, delivery receipts, credit slips, and work orders in the statements you send to your customers. This can reduce billing inquiries and shorten your billing cycle by providing your customers with verification of their transactions. It can also save you time, expense, and postage by providing information electronically instead of manually.



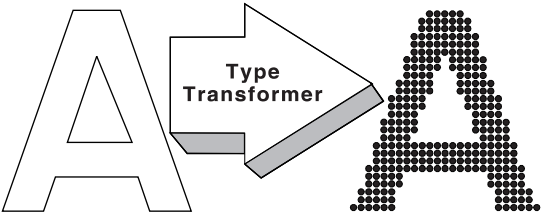
Print your office documents, letters, reports, and presentations but add different fonts, letterheads, logos, signatures, and graphics. This will improve the quality and appearance of your office documents.



Save time and money by creating your own in-house procedural guides, handbooks, and training manuals instead of hiring outside vendors to do them for you.



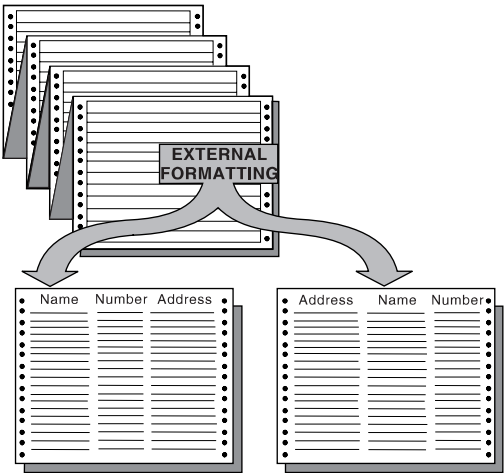
Convert any Adobe Type 1 fonts into fonts that can be used on AFP printers. You can select any fonts you need from over 10 000 styles available in Adobe Type 1 format and use them with your AFP printers.




Print postal permits and bar codes on your documents to convert them into mailers. This can save you the time and expense of filling envelopes and affixing stamps and perhaps can qualify your mail for cheaper postage rates.



Change the format of printed output from your application programs without changing the application program itself. This will improve your programmers' productivity and use a single source of information for different purposes.



Create pages containing images and graphics as well as text. This provides you with more flexibility in creating formats for your printed output.



PRIMO

SALES REPORT

Period: 01/01/1990 - 01/01/1991

Report Date: October 15, 1990

Report Time: 13:57:15

Report User: JAMES

Report Title: SALES REPORT

SALES R. AMES

98765 N. Frontage Road

Tim, Colo. Colorado 80000

CONGRATULATIONS, Sales R. Ames! Because of your excellent credit rating, you are now eligible for free credit insurance which protects you in case your Primo card is ever lost or stolen. Call NOW for more information!

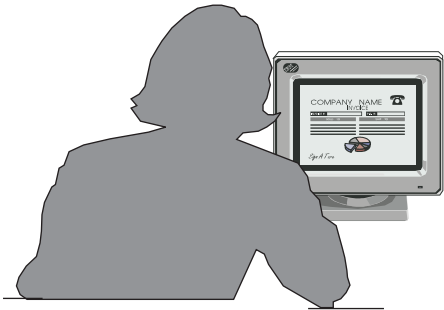
Date	Transaction Description	Amount
08/25	CNTRL BIRN/Lodging Winter Park CO	1173.12
08/25	The Lost Horse Winter Park CO	528.04
08/25	Iron Horse House Winter Park CO	444.08
08/25	Yacht Sales Winter Park CO	534.00
08/25	Yacht Sales Winter Park CO	534.00
08/25	St. John's Winter Park CO	490.61
08/25	Go-Karts Winter Park CO	425.00
08/25	Winter Park Restaurant Winter Park CO	455.23
08/25	Shirley's Restaurant Boulder CO	522.28
08/25	Foot and Ankle Clinic Boulder CO	500.01
08/25	Cocaine Breyer Boulder CO	459.07
08/25	Sally's Your Desk Boulder CO	499.00
08/25	Pro CD Boulder CO	4167.40
08/25	Kids On The Way Denver CO	455.02
08/25	Terence Restaurant Boulder CO	520.15
08/25	Boulder OKL Boulder CO	5264.52
08/25	Prince Jack's Boulder CO	508.00
08/25	FAPA Auto Parts Boulder CO	4167.71
08/25	Harold's Restaurant Boulder CO	536.08
08/25	Clifton Line Boulder CO	4260.51
08/25	Kate's Boulder CO	400.50
08/25	Wally's Jewelry Boulder CO	51,780.00
08/25	Enger's Cards and Books Boulder CO	413.02
08/25	Fireworks Denver CO	518.20
08/25	Real Buy Air Denver CO	4260.04
08/25	Paul's Direct School Denver CO	478.41
08/25	Joe's Gift Denver CO	415.71

Page: 1

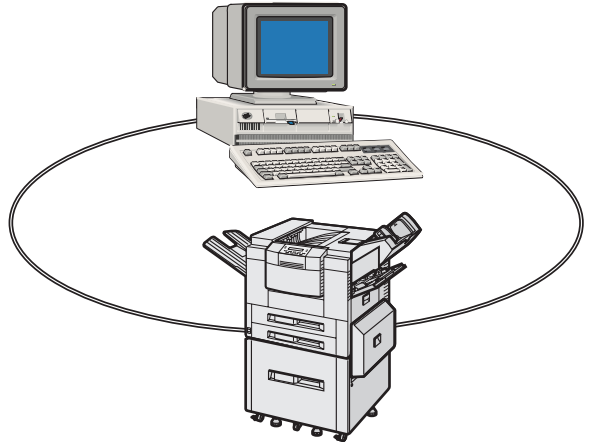
Create electronic documents that can be subsequently viewed, saved, faxed, reprinted, indexed, archived, and retrieved.



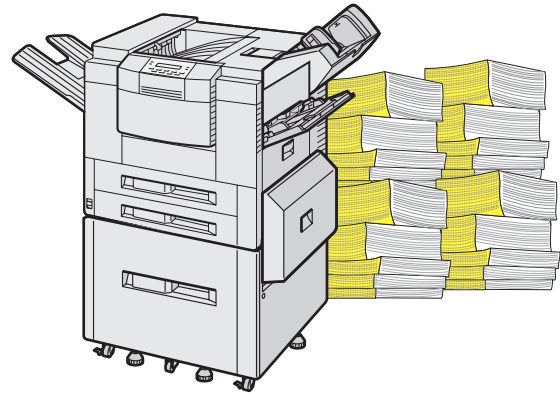
Distribute documents and reports directly to Intranet or Internet customers.



Print to network printers (i.e., TCP/IP-attached) with the same level of document function and print control that you have with system-attached, twinax printers.



Scale up applications from desktop print volumes to production print volumes without changes to applications.



What Are the Benefits of AFP?

Advanced Function Presentation (AFP) is an architected system for printing on AS/400 that integrates print management, application enablers, and high-function printers to generate high quality, effective documents that contain electronic forms, bar codes, images, graphics, and more.

AFP enhances the value of your output applications in the following ways.

Integration

The integration of application, development, and operational functions on AS/400 provides ease of use, productivity, and performance. AFP application development, among many enabling choices, uses high-level languages and Data Description Specifications (DDS), the same interface used in AS/400 application development.

Managing AFP output uses printer files and output queues, and is an extension of AS/400 print management. AFP is integrated into key AS/400 applications such as Imageplus/400, Officevision/400, Facsimile Support for AS/400, OnDemand for AS/400, and Backup Recovery and Media Services (BRMS) for AS/400.

Efficiency

The AFP data stream is a highly structured, architected data stream that yields efficient, high-performance results. Many elements of the electronic document, such as overlays, bar codes, fonts, and image, are managed as separate objects. This means that the actual data stream from the output application is usually small.

Print Management

AFP is integrated into AS/400 print management and provides robust functionality. This functionality allows flexibility in managing and printing output files. And, more importantly, print management tracks the printing process to ensure that print jobs are printed accurately and completely. PSF/400, because of the two-way communication between the system and the printer, can manage down to the page level. AFP provides complete error recovery, guaranteeing the successful delivery of print to the printer.

Network Printing

Placing printers on the network enables a variety of systems and applications to use them. However, the standard print model for network printers is TCP/IP, and native TCP/IP support for print is very limited. AS/400 uses IPDS to manage network printers attached with TCP/IP, achieving the same level of print function and print management as twinax-attached printers.

Object Management

AS/400 is an object-oriented system, as is AFP. This allows applications to be broken up into objects (such as programs, database files, printer files, display files) and developed or managed separately. AFP extends this structure to electronic document elements such as overlays, fonts, and images. Such a structure facilitates a high-performance print process. It also enables the AS/400 system to easily control access to print applications, thus providing a security function.

Printer Integration

The integration of high-function printers with AFP output means that the printing process can be optimized to efficiently handle the support objects for an electronic document. For example, images are compressed to minimize storage and download time while IPDS printers are optimized to process this image, resolving and printing it at high rated speeds. Printing resources, such as fonts, overlays, and images are managed across job boundaries in printer memory, thus improving overall job throughput.

Scalable Applications

Documents and applications are scalable from low to very high print volumes. AFP is a page- and object-oriented architecture that enables performance tuning of print applications as the volumes increase. The actual printing architecture, based on IPDS, enables the AS/400 and the printer to cooperatively manage the printing process. In addition, IBM AS/400 printers scale up from desktop impact printers at 375 characters per second to production laser printing systems at over 1000 pages per minute.

System Performance

The AFP print data stream, its integration into AS/400 spooling subsystems, and external print resources provide the tools to manage and optimize printing performance.

Print Flexibility

AFP applications are part of a broader set of printing requirements for an AS/400 environment, where different print streams and different types of printers are commonplace. A number of tools facilitate the “any to any” printing of application output. AFP print can be routed to network or client-attached printers. Network printing can be routed to AFP printers.

Host Print Transform provides AFP-to-PCL data stream transform services to print AFP output on PCL printers. An AFP-to-TIFF transform enables the use of 3489 graphical displays. Network print servers such as Print Services Facility for OS/2 (PSF/2) provide for the sharing and interchange of printers and print data streams.

Integrated Application Output

Data Description Specifications (DDS) provides powerful, effective electronic documents, because it is integrated with the application program. This means that an individual customer's document can be precisely tailored based on the data for that customer. For example, a customer invoice can be designed dynamically, with invoice segments and document elements dynamically placed based on the actual content of the customer transaction. This results in more readable, effective documents.

Application-Independent Electronic Documents

Where application integration of electronic output does not fit, you have many choices to format your electronic documents, independent of the application program. Advanced Print Utility (APU), page and form definitions, Print Format Utility (a module of Advanced Function Printing Utilities for AS/400 or AFP Utilities), and many third-party products provide this capability.

Postscript and Image Processing

Network applications are generating document data streams, such as Postscript, and image formats, such as GIF and TIFF. Data in these formats can be converted to AFP and then stored or printed from the AS/400.

Beyond Printing

The AS/400 system provides full graphical viewing of print files through the integration of the AFP Workbench Viewer in Client Access/400. This view technology supports all types of print, fax, and image files. After you view a document, you can print, fax, or annotate it from your workstation.

Document and report output files can be merged with image data using ImagePlus, faxed outbound using Facsimile Support for AS/400, or indexed and archived for later retrieval using OnDemand for AS/400.

| As the use of electronic documents and reports continues to gain momentum, fully
| electronic distribution is reversing the traditional document flow of “print then
| distribute” to “distribute then print.” The electronic output can be organized for
| browsing and presented electronically on intranets or the Internet, giving users the
| ability to view the output, and optionally, print it.

Chapter 2. Printing on the AS/400

AS/400 printing was formerly limited to a single print data format and was printed only on twinaxial-connected line printers. Print support in the AS/400 operating system consisted of a single printing subsystem that supported all print application output, spool management, and printer devices. Most AS/400 output was generated in the SNA Character String (SCS) print-data format and was printed on SCS line printers.

Breadth of AS/400 Printing Support

AS/400 now provides a wide range of printing support including AFP printers of various technologies, speeds, and capabilities. AS/400 has also extended print support to the network, enabling it to serve clients and printers on the network.

As printing technology rapidly evolved and organizational requirements for printing expanded, so did the printing support on AS/400. Initially, this expansion took the form of extensions to the SCS data stream (extended text attributes, imbedded image, for example) and support for PC-attached printers. Over time, additional printing support has addressed every phase of the print process, including:

- AFP and ASCII data stream support
- Broad choices in printer attachment, including network-attached printers
- Enhancements to print management, such as remote systems printing, print performance, and print workload balancing
- Extensions to printing, such as view, fax, and archive
- Support of network-attached TCP/IP printer using IPDS.

AS/400 Print Support Print Flow

The AS/400 print flow is shown in Figure 1 on page 13. The following sections describe this process.

An application program creates data to be printed. That output can be formatted in the program (program-described) or externally using DDS. Every program creating printed output on AS/400 has an associated printer file. The printer file defines many of the options of the printing process, from spool routing to page characteristics. Most output is spooled, that is, placed in a holding area called the output queue prior to printing. Actual printing is managed by the print writer, which sends the spooled file to the printer for printing. In fact, the print writer does far more. It must, for example:

- Retrieve the spooled file, and printer device description.
- Determine the print data stream to be sent, based on the device type in the printer file and printer definition in the device description.
- Convert the spool data stream as required.
- Manage the actual printer process. For AFP output, that means managing a two-way dialog with the printer to track each page through each station of the printer.

The components of the print process are described below.

Printer files, both system provided and user created, help you specify how you want your printed output to appear on paper. A printer file can be created either by a user or furnished by the operating system. A printer file can include many parameters, such as characters per inch (cpi), lines per inch (lpi), duplex, pages per side, overlays to be used, and so on.

The printer file contains many values for print jobs, such as those that control how your output is handled and where it goes. Some of the printer file parameters are described below:

- Spool the data (SPOOL), including:
 - Maximum file wait time
 - Number of record formats
 - Number of devices
- Device (DEV), including:
 - Printer device type
 - Page size
 - Front and back margins
 - Fidelity
 - Printer quality
 - Source drawer
 - Output bin
 - Font
 - Form type
 - Pages per side
 - Front and back overlays
- Spooled output queue (OUTQ), including:
 - Maximum spooled output records
 - Spooled output schedule
 - Copies
 - Page range to print
 - Hold spooled file
 - Save spooled file
 - Output priority
 - Record format level check
 - Authority

See “Appendix H. Printer File Parameters” on page 339 for a list of printer file parameters.

You may want to override the default print values and can do so either permanently, by issuing the CHGPRTF (Change Printer File) CL command, or temporarily, by issuing the OVRPRTF (Override Printer File) CL command. Changes made to the printer file with the CHGPRTF command are permanently in effect, while those made with the OVRPRTF command are in effect only for the current session.

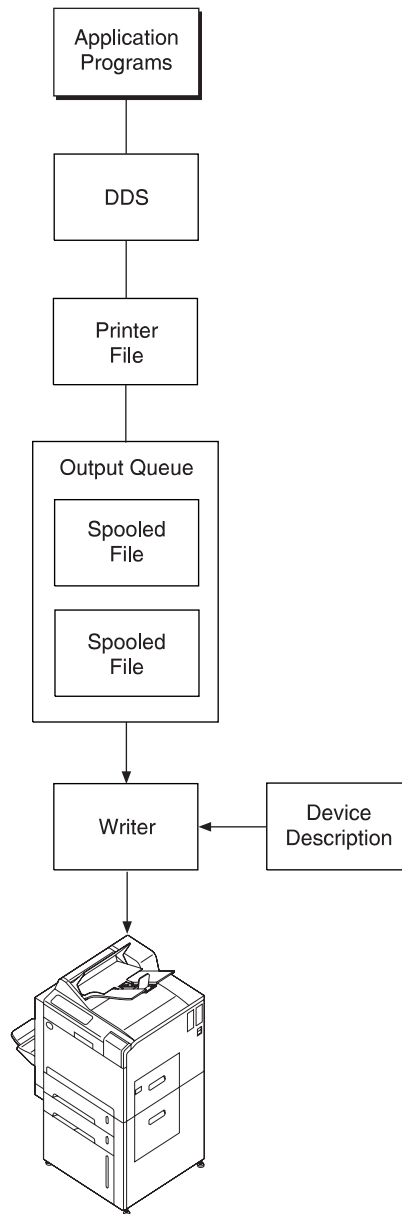


Figure 1. AS/400 Print Flow

Data description specifications (DDS) give you the ability to completely format your application output external to your application program. You can use DDS, for example, to include different electronic overlays on different pages or to select fonts or bar codes for different fields of text.

A **spooled file** is one that holds output data waiting to be processed. Being able to spool a file means that you can choose whether the processed printing job should go directly to a printer or be placed in an output queue where it can be stored until the printer is ready to print.

Printer device descriptions contain information that describes a particular device attached to the system. Device descriptions have to be created for each printer attached to the system. If you use automatic configuration, printer device descriptions are created by the system, with the exception of printers attached to an ASCII work station controller.

Optionally, you can use the Create Device Description (CRTDEVPRT) command to define each printer. You also can use the Create PSF Configuration (CRTPSF CFG) command to specify additional parameters for AFP printers that are not supported by the CRTDEVPRT command. Refer to *CL Reference* and *AS/400 Printer Device Programming* for more information.

The **printer writer** is a function of the operating system that writes (sends) the spooled file from the output queue to the printer.

When your job is ready to be spooled, you issue a call from your program to spool it. Before the call has been issued, though, you can still change or override the printer file (using the CHGPRTF and OVRPRTF CL commands).

After you have called your program, you can still do the following:

- Change some attributes of the spooled file (CHGSPLFA)
- Look at records in the spooled file (DSPSPLF)
- Check the spooled file status (WRKSPLFA)
- Check the printer status (WRKWTR)
- Display current overrides (DSPOVR)
- Look at a list of spooled files in a queue (WRKOUTQ)

AS/400 Print Data Streams

Printed output is the result of the interaction between the printer and the software that controls it. Different printed output requires different types of printers and different software (data streams) to control them.

A print data stream is a set of commands that tell a printer what to do. Some data streams, such as SNA Character String (SCS), include a limited number of commands. Others, such as Intelligent Printer Data Stream (IPDS), include a rich and complex set of commands. As a result, printers that support the simpler data stream are limited to the functions and capabilities of that data stream, whereas printers supporting the richer data stream offer more advanced capabilities. Therefore, it is important to know about data streams so that you can understand specific printer capabilities and limitations, as well as application compatibility and non-compatibility for various printers.

SNA Character String (SCS)

The SNA character string (SCS) data stream has a relatively simple structure, consisting of a one-byte hexadecimal code followed by the data to be printed. SCS, which is the standard pre-AFP print data stream, is used to control line printers and supports row and column functions. SCS and its superset Final Form Text Document Content Architecture (FFT DCA) also support the following printing functions:

- Underscores
- Overstrikes
- Emphasized text
- Partial line spacing
- Margins
- Superscript (with OfficeVision/400)
- Subscript (with OfficeVision/400)

- Font changes in a document (with OfficeVision/400)
- Symbols (with OfficeVision/400)

IBM AFP printers support SCS to provide compatibility with applications that generate SCS. See “Appendix A. IBM Printers and Compatibility Considerations” on page 283 for a list of IBM AFP printers that support SCS.

Final Form Text Document Content Architecture (FFT DCA)

FFT DCA is an extension of SCS used in the OfficeVision/400 environment to define how data streams that represent a document are to be printed and organized. FFT DCA is composed of one-byte and multi-byte (extended) control characters. FFT DCA controls the following functions:

- Top margin location
- Left margin location
- Line spacing
- Font definition
- Justification (aligning of text)
- Beginning and ending of underscores and overstrikes

IBM AFP printers support FFT DCA to provide compatibility with applications that generate SCS. See “Appendix A. IBM Printers and Compatibility Considerations” on page 283 for a list of IBM AFP printers that support FFT DCA.

Advanced Function Printing (AFP) Data Stream

Advanced Function Printing (AFP) Data Stream is the application interface to Advanced Function Presentation (AFP). AFP Data Stream includes data and text, and device independent (not printer specific) references to AFP resources, such as overlays, page segments, font objects, and so on. AFP Data Stream is independent of operating systems and page printers, is portable across environments, and is constructed of structured fields. AFP Data Stream output is produced by a number of application enablers, such as the AFP Toolbox, Advanced Print Utility, DDS, and so on.

AFP Data Stream is a companion data stream to the Intelligent Printer Data Stream (IPDS). The same family of IPDS printers is supported by both AFP Data Stream and IPDS. See “Appendix A. IBM Printers and Compatibility Considerations” on page 283 for a list of IBM AFP printers that support AFP Data Stream.

Intelligent Printer Data Stream (IPDS)

The Intelligent Printer Data Stream (IPDS) is a host-to-printer data stream for Advanced Function Printing subsystems. It provides an interface to all-points-addressable (APA) printers that makes possible the presentation of pages containing an architecturally unlimited mixture of different data types, such as high-quality text, images, graphics, and bar codes.

IPDS includes data and text, and resolved (printer specific) references to AFP resources, such as overlays, page segments, font object, and so on. IPDS supports an interactive, two-way dialogue between the print writer and the printer to provide:

- Printer information

- Cooperative error recovery
- AFP resource management (for example, managing font, image, and overlay resources in printer memory)

Note: IPDS processing depends on the specific printer data is sent to. Not all IPDS commands may be implemented in a specific printer.

The IPDS architecture is divided into functional areas called command sets or towers. This modular design allows printer developers to match selected command sets to specific needs. The command sets are:

- Device control (required)
- Text
- IM (raster) image
- IO (compressed) image
- Graphics
- Bar code
- Page segment
- Overlay
- Loaded font

IPDS is a companion data stream to the AFP Data Stream. The same family of IPDS printers is supported by both AFP Data Stream and IPDS. See “Appendix A. IBM Printers and Compatibility Considerations” on page 283 for a list of IBM AFP printers that support IPDS.

In addition to describing the composition of each page, IPDS is a bi-directional print management architecture. The device control commands facilitate a two-way dialog between the AS/400 writer and the printer. This dialog controls page development, job processing, job status, and error recovery. For example, at the start of a new print job, the writer will query the printer to determine what font, image, and overlay resources are already in printer memory. Any missing resources are sent down to the printer. Each operation is managed to completion (i.e., an acknowledgment that a resource was received successfully).

PostScript to AFP Data Stream

PostScript is a data stream generated by many PC and network station applications. The new IBM Network Station, which can be attached to an AS/400 server, generates the PostScript data stream. If that PostScript data stream is being spooled to the AS/400, the data stream must be converted to AFP data stream in order to print on an IPDS printer. PSF V4R2 supports the PostScript-to-AFP Data Stream conversion for PostScript level 1.

To facilitate this conversion from PostScript to AFP data stream, the system administrator must configure the AS/400 device description with the IMGCFG parameter, setting it to the name of the IMGCFG object that describes the output device. See “Using an AFP Printer to Print PostScript Output” in Chapter 19 for a list of limitations and details regarding the device configuration necessary to enable PostScript to AFP data stream conversion.

American National Standard Code for Information Interchange (ASCII)

Unlike the other printer data streams covered in this section, no formal structure governs the use of the ASCII data stream to control printers. Although ASCII forms the basis for the control and character codes, not all ASCII printers conform fully to this standard. Additional command sets based on hexadecimal codes are often used with advanced function printers to exploit the capabilities of these printers. In the ASCII environment, therefore, the range and types of printing functions available to the user are governed by individual programs tailored to suit each type of printer. See “Appendix A. IBM Printers and Compatibility Considerations” on page 283 for a list of IBM AFP printers that support ASCII.

ASCII printer applications are printer dependent, and ASCII printers are driven by emulator programs that create an ASCII set of controls from an EBCDIC data stream.

While most ASCII printer data streams have been created to support specific printers, two standards have emerged for describing pages of ASCII information: Postscript and PCL. Postscript is a standard administered by Adobe. PCL is administered by Hewlett-Packard.

In AS/400 printing, ASCII support is provided by translating SCS and AFP print data streams to their ASCII equivalents. This translation is normally done by Host Print Transform (it can also be done at the client through print emulators). ASCII printers can be attached to AS/400 in a variety of ways, and all can use Host Print Transform. Host Print Transform is integrated into the following printing functions:

- AS/400 Print Writer
- Send TCP Spooled File (LPR)
- LAN Print Driver

Host Print Transform is specified in the printer device description. A large number of ASCII printers (each with its own set of ASCII printer control codes) can be selected. Host Print Transform can provide two types of data stream transformations:

- SCS to ASCII
- AFP to PCL or PPDS

SCS to ASCII

Host Print Transform translates SCS to ASCII, thereby providing 3812 SCS printer emulation. This is similar to the printer emulation in Client Access/400 Workstation Function or Rumba/400.

AFP to PCL or PPDS

Host Print Transform translates full-page AFP output into HP PCL or Lexmark PPDS print data streams. This transform uses one of two different modes: raster or mapping, depending on output and printer characteristics. Raster mode converts the AFP pages to image. This preserves print fidelity, but at a cost of print file size and performance. Mapping mode converts AFP resources (fonts, bar codes, overlays, and page segments) into PCL and PPDS equivalents. Refer to “Chapter 18. Network Printing” on page 261 for more information on AFP transforms using Host Print Transform.

The AFP to PCL/PPDS transform expands your choices when implementing AFP printing applications. It is particularly well-suited for providing the capability of reprinting subsets of a larger AFP printing job (reprinting an invoice, for example) or supporting smaller print volumes at a remote branch office. Factors such as print fidelity, AS/400 system impact, and overall print performance can affect how this function is used.

Chapter 3. Introduction to Advanced Function Presentation (AFP)

What Is AFP?

Let's take a closer look at AFP.

Advanced Function Presentation can best be understood by describing its component parts:

- Document or page layout architecture
- Printing or presentation architecture
- Print Management System
- Printer architecture

AFP enables electronic, principally page-mode, printing. As such, it defines how document pages are produced. The AFP data stream is a printer-independent data stream that composes full pages within a document. Figure 2 on page 20 shows an electronic invoice, one page of an invoicing document.





400 CPU Parkway Vegetation, NJ 55090		<div style="display: flex; justify-content: space-between;"> <div> Super Sun Seeds A Growth Company </div> <div> Office: 555-499-2367 Fax: 555-415-9794 </div> </div>			
<div style="display: flex; justify-content: space-between;"> <div style="width: 60%;">  </div> <div style="width: 35%; text-align: right;"> SAME </div> </div> <div style="margin-top: 5px;"> LOS ARBOLES DEL MUNDO 32483 ARBOL LANE MESA VERDE IL 65478-9390 </div>					
<div style="display: flex; justify-content: space-between;"> <div>-- Sold To --</div> <div>-- Ship To --</div> </div>					
Customer Number: 141	Invoice Number: 31341	Invoice Date: 7/28/95			
Payment Date: 8/28/95					
Ship Via: Ship Date: 7/28/95 Terms: N10 Salesman: MICHELE GOODACRE					
Qty	UOM	Item #	Item Description	Price	Extension
1000	BX	56413213	POT POT	7.65	7,650.00
45	BZ	11005015	CHANTENAY SEEDS	2.19	98.55
900	EA	00001200	ARBOLES DEL SUR	45.00	40,500.00
98	PK	84512023	OREGON SPRING TOMATO SEED	.97	95.06
4	BX	11057893	AFRICAN DAISY, SEEDS	2.35	9.40
951	CT	11005011	LASSO RED SEEDS	892.23	48,510.73
46	DZ	11005014	SCARLET NANTES SEEDS	5.90	271.40
100	EA	31321655	SEMILLAS DEL SUS SOMBEROS	24.95	2,495.00
<div style="display: flex; align-items: center; justify-content: center;">  <div style="margin-left: 10px;"> <p><i>Thank You</i></p> <p><i>Because almost half of</i></p> <p><i>your order was Lasso Red</i></p> <p><i>Seeds, you will receive</i></p> <p><i>a 10% discount on your</i></p> <p><i>next order.</i></p> </div> </div>					
Total Due					\$99,630.14
<div style="display: flex; justify-content: space-between;"> <div style="width: 45%;"> <p><i>Return this tear-off strip with your payment.</i></p> <p>Payment is due by: 8/28/95</p> <p>LOS ARBOLES DEL MUNDO 32483 ARBOL LANE MESA VERDE IL 65478-9390</p> </div> <div style="width: 45%; text-align: right;"> <p><i>Make Checks Payable to:</i> Super Sun Seeds</p> <p><i>Amount Due is:</i> \$99,630.14</p> </div> </div> <div style="text-align: center; margin-top: 20px;">  0001410099630146 </div>					

Figure 2. Super Sun Seeds Example Electronic Invoice

Traditional line-mode print applications compose a line at a time down the page (usually continuous form pages), whereas AFP composes the entire page prior to printing. Page elements, such as text, image, bar code, and overlays, can be specified in any order at any position within the page: top to bottom, bottom to top, or no real sequence at all. AFP uses an X-Y coordinate system to precisely place each element anywhere on the page.

The AFP data stream is actually composed of structured fields (see Figure 3 on page 21). These structured fields provide for a compact, efficient data stream. When you develop your applications using a programming language such as RPG or

COBOL, you do not have to be concerned with the structured fields because OS/400 creates them for you.

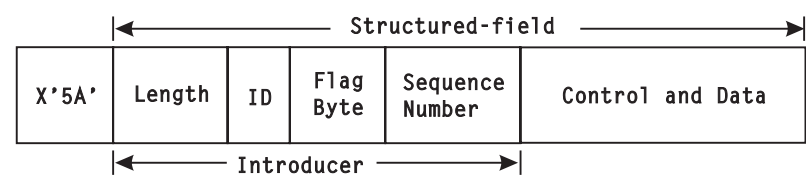


Figure 3. Structured Field

AFP is also a printing or presentation architecture. It is based on the MO:DCA-P (Mixed Object: Document Content Architecture-Presentation) standard, which is both system and printer independent. As the name implies, the architecture defines how mixed objects (image, graphics, fonts, overlays, and bar codes) are to be pulled together and presented as a single page or document. The structure of a MO:DCA-P document is shown in Figure 4.

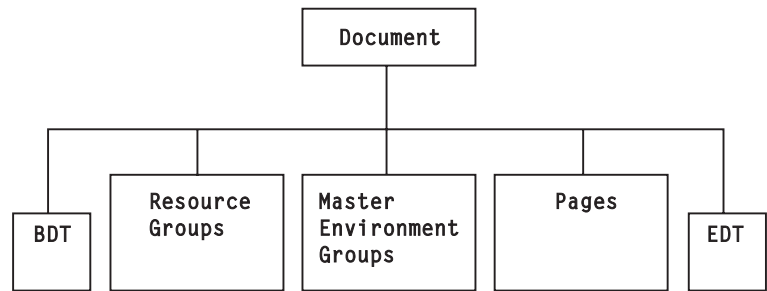


Figure 4. MO:DCA-P Document Structure

As Figure 4 illustrates, every AFP document is framed with “Begin Document (BDT)” and “End Document (EDT)” structured fields. After the Begin Document, resources to be used, such as overlays, page segments, or fonts, are defined. Then, the standard or default options, such as fonts, for the entire document are defined. And lastly, the actual pages of the electronic output are specified.

MO:DCA-P provides a precise structure to page and document composition. Consider the Super Sun Seeds invoicing application. If the document is defined as one thousand Super Sun Seeds invoices, the structure (and resulting performance and efficiency) emerges. Page elements (fonts, overlays, and images or page segments) are defined up front in the resource group. These elements are defined once and then referenced as required throughout the one thousand invoices. The master environment group defines characteristics about groups of pages (for example, copies of a page) or sub-pages. Again, basic composition structure is defined once and used throughout the document. The pages section contains the specific structured fields to build each page.

MO:DCA-P consists of mixed objects, with each of the constituent objects having its own structure or architecture. The object types are described in the following sections.

Bar Code Object Content Architecture (BCOCA)

Bar Code Object Content Architecture (BCOCA) defines how the various industry-standard bar codes are to be composed. A bar code object can contain draw rule commands (like graphic commands) or raster data, depending on how that specific bar code is to be created. A bar code object containing draw rule commands contains instructions for lines of specific width and length, matching that of a particular bar code standard.

Image Object Content Architecture (IOCA)

Image Object Content Architecture (IOCA) represents image data in device-independent format. This allows the image to be scaled to the print resolution of different printers, for example. IOCA also supports image compression, reducing the storage size of the image data by 70% or more.

Graphics Object Content Architecture (GOCA)

Graphics Object Content Architecture (GOCA) describes complex pictures that are built by a series of graphic commands. On AS/400, Business Graphic Utility (BGU) and Graphic Data Display Manager (GDDM) create GOCA files such as bar charts and pie charts.

Presentation Text Object Content Architecture (PTOCA)

Presentation Text Object Content Architecture (PTOCA) defines how text is presented and positioned in the document. PTOCA must handle text in a wide variety of types, positions, and orientations.

Font Object Content Architecture (FOCA)

Font Object Content Architecture (FOCA) defines a consistent format and structure for font resources. Figure 5 on page 23 shows the object-oriented nature of AFP.

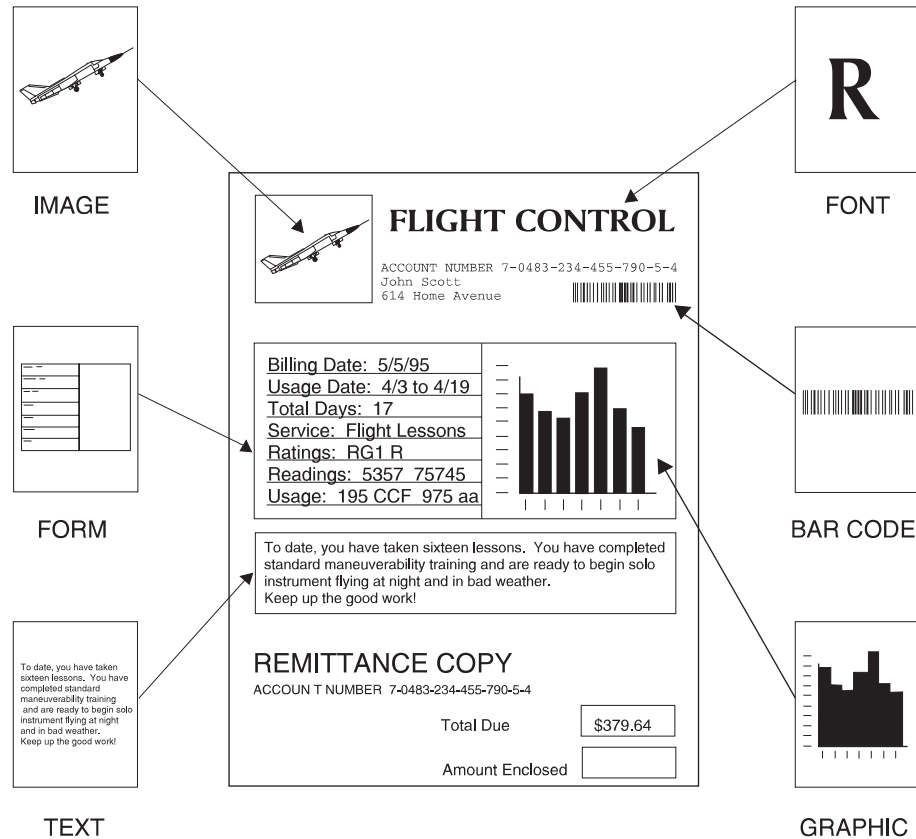


Figure 5. AFP Object-Oriented Architecture

MO:DCA IOB Support

With support of MO:DCA IOB, applications can include images, bar codes, page segments, and graphics in documents, taking advantage of scaling and rotating capabilities. For example, you can include a single copy of a company logo in the resource libraries, scaling and rotating the logo as necessary. You no longer need to include a copy of the logo in different sizes and rotations. MO:DCA IOB support is new with PSF/400 Revision 4 Version 2.

Note: Images, bar codes and graphics can be included via an IOB only if they are inline objects within the data stream. There is no mechanism in AS/400 to store these as external objects on the system.

The AFP Printing Subsystem in OS/400

With OS/400 V2R1, an implementation of the AFP print subsystem was added to OS/400 as an integrated component of the operating system. This implementation meant that OS/400 has two separate printing subsystems in the operating system.

OS/400 print support continues to support line printers and a subset of IPDS printers and print functions, while the integrated AFP printing subsystem provides full support for all IPDS printers. Which of these two printing subsystems will be used to process application output is determined by the device description for the

target printer. Only printers defined as AFP(*YES) in the printer device description are controlled by the AFP printing subsystem.

Activating the AFP Printing Subsystem with Print Services Facility for AS/400

With OS/400 Version 3, a separate feature of OS/400 called Print Services Facility for AS/400 (PSF/400) was introduced. The OS/400 AFP printing subsystem continued to be functionally integrated in the operating system but now is activated through PSF/400, which is the AFP system software for AS/400 printers using the IPDS printer data stream. PSF/400 enables AS/400 users and applications to take full advantage of IPDS printer capabilities.

Because AFP is integrated with OS/400 print support mechanisms such as printer files and data description specifications (DDS), it is an extension of print processes already familiar to most AS/400 users. AFP also works well with other IBM AS/400 applications such as Facsimile Support for AS/400, PC Support/400, Client Access/400, and OfficeVision/400.

PSF/400 ensures that applications and their AFP resources print consistently on all of the printers it manages. PSF/400 transforms and prints the following data streams:

- IBM Mixed Object Content Document Architecture for Presentation (MO:DCA-P), also called the Advanced Function Printing data stream (AFPDS), the device-independent AFP page data format
- IPDS, the device-dependent page printer data stream
- SNA Character String (SCS), the AS/400 line printer data stream
- Extended binary-coded decimal interchange code (EBCDIC) line printer data generated from a System/390 environment

AFP (PSF/400) Printing Subsystem Print Flow

The AFP (PSF/400) printing subsystem print flow, shown in Figure 6 on page 25, is similar to the OS/400 print flow, making AFP on the AS/400 easy to use.

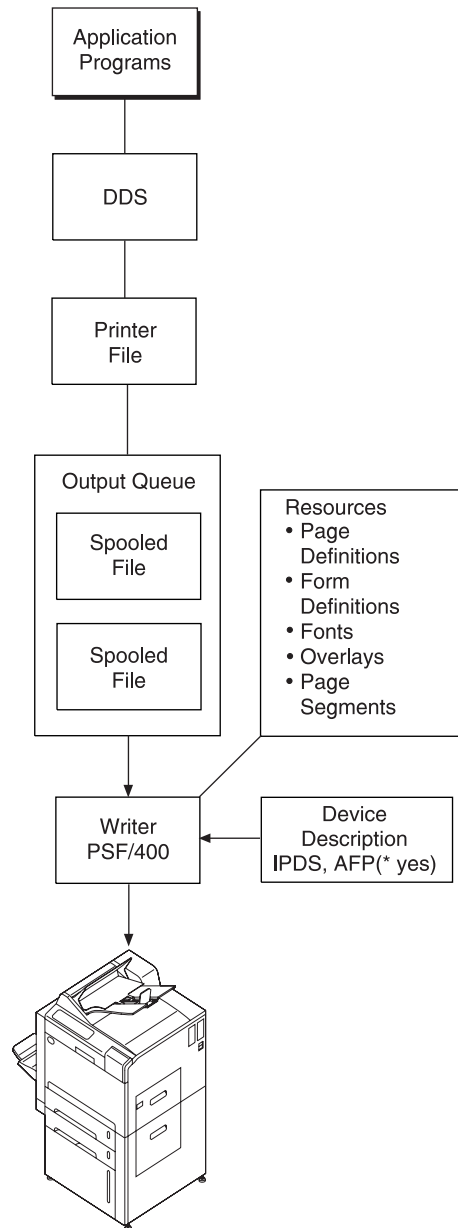


Figure 6. AFP (PSF/400) Printing Subsystem Print Flow

The AFP (PSF/400) printer subsystem print flow is described below.

Application programs generate output that can be either program-described or externally-described. If the output is program-described, then the application program (RPG, COBOL, and so on) formats all of the data on the page one line at a time. The program can produce AFP directly, or it can use an application enabler such as the AFP Toolbox to create the output.

If the output is externally-described, the application program simply creates records. These records are processed by Data Description Specifications (DDS), which is separate source and object code from the RPG or COBOL program.

DDS keywords determine how each field of every record from the application program is formatted on the page. Fields can be individually placed on the page in

any font or orientation. Some fields can be placed on the page as bar codes. DDS keywords allow lines and boxes to be drawn, as well as many sophisticated formatting options, such as the selection of AFP overlays. DDS can be used in both the OS/400 printer subsystem and the AFP printer subsystem, but many more formatting capabilities are available with AFP. See “Chapter 11. Using Data Description Specifications” on page 127 for more information.

The application program may or may not use DDS, but it always uses a **printer file**. This is the same printer file used in the OS/400 printer subsystem. Values specified in the printer file determine general characteristics of the entire print job, such as what printer the job will be sent to, whether to print simplex or duplex, whether to print multiple pages per side, whether to add an overlay to every page, and so on.

A **spooled file** is created on an output queue, just as it is in the OS/400 print flow. The difference is that an AFP spooled file can contain references to resources that will be needed to print the file. These references result from the printer file parameters and DDS keywords that were used when the file was created. The resources may be downloadable fonts, AFP overlays, and page segments (scanned images such as logos or signatures). Other resources that may be referenced by a spooled file are page definitions and form definitions, even though they are less common in the AS/400 environment. See “Chapter 13. Using Page Definitions and Form Definitions” on page 193 for more information.

In the AFP print flow, the **device description** of the printer to which the output is being sent will specify a device type of IPDS, AFP(*YES). This means that the printer is an IPDS device capable of handling all AFP functions, such as downloading resources, printing graphical information from DDS, and so on.

The function of the **print writer** in the AFP print subsystem is performed by Print Services Facility for AS/400 (PSF/400), which is a feature of the operating system.

The PSF/400 printer writer has three primary functions:

1. Perform any necessary data stream transforms on the spooled file and take it off the output queue. The data stream of the spooled file may be either SCS, IPDS, or AFP data stream, as determined by the printer file. The spooled file must be transformed into the correct printer-specific IPDS data stream.
2. Gather any resources referenced by the spooled file. These resources can be fonts, page segments, overlays, and so on.
3. Send the transformed spooled file and its resources to the printer. Because IPDS is a bidirectional data stream, the print writer must also participate in a two-way dialogue with the printer. Through this dialogue, PSF/400 manages error recovery. If printer intervention is required during the printing of a job, for example, PSF/400 resumes printing at the next page in the job so that no data is lost and the job does not have to be sent to the printer again.

Printers and PSF/400

PSF/400 supports the entire family of IBM IPDS printers as well as IPDS printers from other vendors. PSF/400 support may be required or optional, depending upon the particular printer specified.

When PSF/400 Is Required

PSF/400 is required to provide support for the following IBM IPDS printers:

- IBM 3130 Advanced Function Printer
- IBM 3160 Advanced Function Printer
- IBM 3812 Page Printer
- IBM 3816 Page Printer
- IBM 3820 Page Printer
- IBM 3825 Page Printer
- IBM 3827 Page Printer
- IBM 3828 Advanced Function MICR Printer
- IBM 3829 Advanced Function Printer
- IBM 3835-001 Page Printer
- IBM 3835-002 Advanced Function Printer
- IBM 3900 Advanced Function Printer (all models)
- IBM 3935 Advanced Function Printer
- IBM InfoPrint 60
- IBM InfoPrint 62
- IBM InfoPrint 4000

PSF/400 is also required when:

- Any printer has the AFP parameter specified as *YES in the printer device description
- Print is distributed to IPDS or Hewlett-Packard PCL4 or PCL5 printers attached (DPF or Direct) to a Print Services Facility for OS/2 (PSF/2) LAN print server
- Any application printer file uses the AFPDS keyword on the DEVTYPE parameter
- AS/400 is used to print any AFP data stream or S/390 line or mixed mode data from an IBM or IBM-compatible mainframe system
- The Advanced Function Printing Utilities for AS/400 licensed program is to be used
- The Facsimile Support for AS/400 licensed program offering is to be used (except when the modem is a 7852-400, in which case PSF is not required because Host Print Transform is used)

When PSF/400 Is Optional

PSF/400 is optional when providing support for the following IPDS printers or printer models, because these printers can be driven by the OS/400 printing subsystem:

- IBM 3112 and 3116 Laser Printers
- IBM 3912 and 3916 Page Printers
- IBM 3930 Page Printer
- IBM 4028 Laser Printer
- IBM 4224 Printer (IPDS Model)
- IBM 4230 Printer (IPDS Model)
- IBM 4234 Printer (IPDS Model)
- IBM 4247 Printer (IPDS Model)
- IBM 6400-004 Line Matrix Printer

- IBM 6400-005 Line Matrix Printer
- IBM 6400-005P Line Matrix Printer
- IBM 6400-008 Line Matrix Printer
- IBM 6400-008P Line Matrix Printer
- IBM 6400-009 Line Matrix Printer
- IBM 6400-009P Line Matrix Printer
- IBM 6400-012 Line Matrix Printer
- IBM 6400-014 Line Matrix Printer
- IBM 6408 Line Matrix Printer (IPDS Model)
- IBM 6412 Line Matrix Printer (IPDS Model)
- IBM InfoPrint 20
- IBM InfoPrint 32
- IBM Network Printer 12
- IBM Network Printer 17
- IBM Network Printer 24
- Non-IBM IPDS printers

Note: If you wish to take advantage of the AFP functions provided by these printers, you must use PSF/400.

Printer File Parameters and DDS Keywords Requiring PSF/400

Printer files and data description specifications (DDS) are the user and application program interfaces for printing in AS/400, and both continue to be part of the operating system. Table 1 lists printer file parameters and DDS keywords that affect print formatting and handling. When you use these parameters and keywords, you must use PSF/400 when printing to an IPDS printer.

Table 1. Printer File Parameters and DDS Keywords Requiring PSF/400

Printer File Parameters	DDS Keywords
User resource library list (USRRSCLIBL)	Box (BOX)
Coded font (CDEFNT)	Coded font (CDEFNT)
Corner staple (CORNERSTPL)	
Device type (DEVTYPE=*AFPDS, *LINE, or *AFPDS LINE)	Force (FORCE)
Edge stitch (EDGESTITCH)	End page (ENDPAGE)
Font character set (FNTCHRSET)	Font character set (FNTCHRSET)
Front margin (FRONTMGN)	Graphic data file (GDF)
Back margin (BACKMGN)	Line (LINE)
Front overlay (FRONTOVL)	Overlay (OVERLAY)
Back overlay (BACKOVL)	Page segment (PAGSEG)
Font resolution for formatting (FNTRSL)	Position (POSITION)
Output bin (OUTBIN)	Output bin (OUTBIN)
Form definition (FORMDEF)	Text rotate (TXTRTT)
Page definition (PAGEDEF)	Duplex (DUPLEX)
IPDS pass through (IPDSPASTHR)	Invoke medium map (INVMMAP)

Table 1. Printer File Parameters and DDS Keywords Requiring PSF/400 (continued)


Printer File Parameters	DDS Keywords
IGC coded font (IGCCDEFNT)	Invoke data map (INVDTAMAP)
AFP characters (AFPCHARS)	
Table reference characters (TBLREFCHR)	
Saddle stitch (SADLSTITCH)	Z-fold (ZFOLD)

Understanding Advanced Function Presentation (AFP) Output

AFP output can contain text data, image data, graphics, bar codes, or a combination of these data types on a single page.

Figure 7 on page 30 shows a sample of AFP output using PSF/400. The sample page shows examples of the data described on the following pages. The sample page will be used throughout this publication to illustrate the various AFP functions that you can use for printing.

400 CPU Parkway
Vegetation, NJ 55090



**Super
Sun
Seeds**
A Growth Company

Office: 555-499-2367
Fax: 555-415-9794

LOS ARBOLES DEL MUNDO
32483 ARBOL LANE
MESA VERDE
IL 65478-9390

SAME

-- Sold To --

-- Ship To --

Customer Number: 141

Invoice Number: 31341

Invoice Date: 7/28/95

Payment Date: 8/28/95


Ship Via:

Ship Date: 7/28/95

Terms: N10

Salesman: MICHELE GOODACRE

Qty	UCM	Item #	Item Description	Price	Extension
1000	BX	56413213	POT POT	7.65	7,650.00
45	BZ	11005015	CHANTENAY SEEDS	2.19	98.55
900	EA	00001200	ARBOLES DEL SUR	45.00	40,500.00
98	PK	84512023	OREGON SPRING TOMATO SEED	.97	95.06
4	BX	11057893	AFRICAN DAISY, SEEDS	2.35	9.40
951	CT	11005011	LASSO RED SEEDS	892.23	48,510.73
46	DZ	11005014	SCARLET NANTES SEEDS	5.90	271.40
100	EA	31321655	SEMILLAS DEL SUS SOMBEROS	24.95	2,495.00



*Thank You
Because almost half of
your order was Lasso Red
Seeds, you will receive
a 10% discount on your
next order.*

Total Due


\$99,630.14

Return this tear-off strip with your payment.
Payment is due by: 8/28/95

Make Checks Payable to:
Amount Due is:

Super Sun Seeds
\$99,630.14

LOS ARBOLES DEL MUNDO
32483 ARBOL LANE
MESA VERDE
IL 65478-9390



0001410099630146


Figure 10. Image on the Sample Page

Graphics on a Page: AFP output can contain graphics data that is stored in vector representation. Graphics data, also called vector-graphics data, contains commands to draw lines, arcs, and circles and can be used to represent something as complex as a three-dimensional engineering drawing.

Graphics data is created by a program and stored in a set of MO:DCA-P structured fields called a graphics data object. A graphics data object can be included in a print job, in an overlay resource, or in a page segment resource. PSF/400 accesses and sends graphics resources to the printer with the print job. See “Chapter 7. Image and Graphics” on page 73 for more information.

Figure 11 on page 34 shows graphics data printed on the sample page.

400 CPU Parkway
Vegetation, NJ 55090



**Super
Sun
Seeds**
A Growth Company

Office: 555-499-2367
Fax: 555-415-9794

|||||
LOS ARBOLES DEL MUNDO
32483 ARBOL LANE
MESA VERDE
IL 65478-9390

SAME

-- Sold To --

-- Ship To --

Customer Number: 141

Invoice Number: 31341

Invoice Date: 7/28/95

Payment Date: 8/28/95

Ship Via:


Ship Date: 7/28/95

Terms: N10

Salesman: MICHELE GOODACRE

Qty	UOM	Item #	Item Description	Price	Extension
1000	BX	56413213	POT POT	7.65	7,650.00
45	BZ	11005015	CHANTENAY SEEDS	2.19	98.55
900	EA	00001200	ARBOLES DEL SUR	45.00	40,500.00
98	PK	84512023	OREGON SPRING TOMATO SEED	.97	95.06
4	BX	11057893	AFRICAN DAISY, SEEDS	2.35	9.40
951	CT	11005011	LASSO RED SEEDS	892.23	48,510.73
46	DZ	11005014	SCARLET NANTES SEEDS	5.90	271.40
100	EA	31321655	SEMILLAS DEL SUS SOMBEROS	24.95	2,495.00

Graphic



*Thank You
Because almost half of
your order was Lasso Red
Seeds, you will receive
a 10% discount on your
next order.*

Total Due

\$99,630.14


Return this tear-off strip with your payment.

Make Checks Payable to: **Super Sun Seeds**

Payment is due by: 8/28/95

Amount Due is: \$99,630.14

LOS ARBOLES DEL MUNDO
32483 ARBOL LANE
MESA VERDE
IL 65478-9390



0001410099630146

Figure 11. Graphic on the Sample Page

Some options available with graphics data objects are:

- The graphics data can be placed in any position on the page.
- Graphics data can be scaled by the printer to any size (that is, enlarged or reduced).
- Graphics data can be rotated by the printer.
- Graphics data can be clipped by the printer so that only a portion of the graphic is printed.
- A graphics data object can include MO:DCA-P text data.

Bar Codes: Bar codes represent characters by sets of parallel bars of varying thickness and separation that can be read optically by transverse scanning. These codes can represent, for example, product numbers, part numbers, and zip codes.

Figure 12 on page 35 shows bar codes printed on the sample page. The zip code at the top of the sample page is printed in POSTNET bar code. The customer number and invoice amount are printed in Interleaved 2 of 5 bar code at the bottom of the page.

Figure 13 shows a sample electronic form (overlay).


400 CPU Parkway Vegetation, NJ 55090		 Super Sun Seeds A Growth Company		Office: 555-499-2367 Fax: 555-415-9794	
<div style="display: flex; justify-content: space-between;"> -- Sold To -- -- Ship To -- </div>					
Customer Number:		Invoice Number:		Invoice Date:	
Ship Via:		Ship Date:		Salesman:	
Qty	UOM	Item #	Item Description	Price	Extension
Total Due					
<div style="display: flex; justify-content: space-between;"> <div> <i>Return this tear-off strip with your payment.</i> Payment is due by: </div> <div> <i>Make Checks Payable to:</i> Amount Due is: </div> </div>					

Figure 13. Sample Electronic Form (Overlay)

AS/400 AFP Formatting Resources

AFP supports two external resources for formatting pages—form definitions and page definitions. These resources contain rules for mapping application output into fully composed pages. Page definitions and form definitions are external to the application program and thus separate the final document formatting from the application. Since these resources represent a subset of the functionality available with DDS, you would normally use them where you wanted the formatting to be application-independent.

Form Definitions

A *form definition* is the resource that specifies the physical attributes of the printed output. The word *form* refers to a sheet of paper or other print media.

Support for creating and using form definitions in the AS/400 AFP subsystem was added in PSF/400 V3R2. Before that, form definitions could be created only on the RISC/6000 and S/390 systems or with PC products such as ISIS or Elixir, and could be used on the AS/400 by means of a set of APIs called PrintManager/400, or by routing print jobs from MVS or VM using Network Job Entry (NJE).

A form definition performs many of the same functions as a printer file on the AS/400, but whereas a printer file is required, a form definition is optional. If you do

not specify a form definition, media handling characteristics are taken from other existing keywords. If you do specify a form definition, its media handling instructions override those specified in existing keywords.

If you choose to use a form definition, you must specify its name in the printer file.

A form definition contains printing controls that specify the following, within the limitations of each printer:

- Page origin (the top-left boundary for printing). Page origin may be different for the front and back of the page when duplexing.
- Sheets that have overlays printed on them.
- Number of copies of each page to be printed.
- Paper source (input bin of the printer) for printers with more than one paper source.
- Simplex (printing on just one side of a sheet) or duplex (printing on both sides of a sheet on printers that support duplex printing).
- Page presentation (portrait or landscape).
- Print-quality level (on printers that support different levels of print quality).
- Horizontal adjustment in pels or dots per inch (dpi).
- N_UP Printing: printing multiple logical pages on a sheet. These pages can be either MO:DCA-P pages (fully composed pages containing data and the structured fields controlling presentation of the data) or line data.

See “Chapter 13. Using Page Definitions and Form Definitions” on page 193 for more information on form definitions.

Page Definitions

A *page definition* is the resource that specifies how line data is to be formatted into pages by PSF/400. PSF/400 does not use a page definition for MO:DCA-P (AFPDS) data, because that data is already composed into pages before PSF/400 receives it.

A page definition performs many of the same functions that are available on the AS/400 by means of DDS. The page definition is an alternative to DDS for formatting data on a page independent of the application program.

Specifying a page definition is optional. If you do not specify a page definition, media handling characteristics are taken from existing keywords. If you do specify a page definition, its media handling instructions override those specified in existing keywords.

If you choose to use a page definition, you must specify its name in the printer file.

A page definition contains formatting information that specifies the following:

- Fonts to be used for printing the data
- Where data from each input record is to be printed
- Constant data to be printed
- Data fields that can be suppressed
- Print position for carriage controls or channel codes
- List of page segments

- List of page overlays
- Conditional processing
- Color selection (for printers that support printing in multiple colors)
- Page size (height and width)
- Print direction for the page of data
- Number of lines per inch

See “Chapter 13. Using Page Definitions and Form Definitions” on page 193 for more information on page definitions.

AFP Performance Enhancements

To use the full capabilities of AFP printing, additional system resources are needed, and this can adversely affect printer and system performance.

A number of recent enhancements in AFP support have significantly improved system and printer performance. These include:

- Overlays and page segments are retained at the printer across job boundaries. Prior to V3R1, overlays and page segments were downloaded for every job, even if they were already at the printer.
- IPDS Passthrough sends non-AFP jobs directly to the printer, bypassing the IPDS to AFPDS to IPDS conversion process. Use WRKAFF2 or CRTPSFCFG and specify IPDS Passthrough *YES. Jobs that require the conversion are converted without need of user intervention.
- Since V2R2, AS/400 “Autotune” (system value QPFRADJ, performance adjustment) supports modifying the memory allocation for *SPOOL storage pool to provide improved AFP print performance.
- Because AFP printing is a cooperative process between the AS/400 and the printer, recent advances in printer technology have improved overall printing throughput. For example, the high-speed print controller (called the Advanced Function Common Control Unit, or AFCCU) of the IBM 3130 and 3160 Advanced Function Printers and the InfoPrint printers provides the memory and processing power to quickly resolve AFP data streams and resources (fonts, images, overlays, bar codes) into completed pages.
- Other improvements to PSF/400 (font capture, cut-sheet emulation, memory utilization, disk I/O, and so on) improve operating efficiency.
- Additional choices, such as Print Services Facility/2 (PSF/2), allow you to offload AFP print jobs.

Chapter 4. Working with AFP

Because AFP is built into the AS/400, it is natural that there are many AS/400 applications that work with it. There are enabling applications, tools that help you build AFP applications. There are complementary applications, applications that work with AFP output or AFP data streams. And, there are applications (line of business functions, such as billing, accounts payable, and so on) that simply incorporate AFP for electronic output.

Enabling Applications

The following list describes the enabling applications and their components.

- **AFP PrintSuite**

AFP PrintSuite for AS/400 is a family of different solutions for building AFP applications. The following tools (separately orderable) are generally application-independent approaches to formatting electronic pages.

- **Advanced Print Utility (APU)**

APU is an interactive, end-user system for transforming existing application output to advanced electronic output. Current line-mode output can be migrated to electronic business documents utilizing electronic forms, image, graphics, fonts, and bar codes. APU will create complex output, including multiple page formats and conditional logic, all without changes to the existing application.

- **Page Printer Formatting Aid (PPFA)**

PPFA provides the capability to create AFP Page Definitions and Form Definitions on OS/400. Page Definitions and Form Definitions are print format definitions that control how application output is to be mapped to the printed page. They provide document formatting and data mapping capabilities (conditional processing, electronic overlays, copies, etc.), supporting the full range of print application requirements. These definitions provide an application-independent, high-performance method of transforming existing print applications to electronic output.

- **Advanced Function Printing Toolbox**

AFP Toolbox enables you to take full control over the power of the AFP data stream, but do it with an easy, object programming interface. AFP Toolbox, through a set of C objects, functions, and callable APIs, enables you to update your print applications to take full advantage of new printer technologies such as color, image, and electronic forms. AFP Toolbox should be used where you have a requirement for a dynamic program interface to the printed page.

- **SAP R/3 AFP Print Feature**

SAP R/3 AFP Print converts SAP's R/3 data streams into IBM's AFP data stream or line data. This support includes the capability to customize output with signatures, logos, and bar codes through inclusion of AFP resources. This output can then be printed on AFP printers using PSF/400.

In addition, extended electronic formatting can be added to the R/3 output through the use of page and form definitions. This enables the migration of R/3 line-mode output to electronic documents, with overlays, image, and bar coding.

- **IBM Advanced Function Printing Utilities for AS/400 (AFP Utilities)**

AFP Utilities are a set of three utilities that support the creation of AFP applications. AFP Utilities include:

- **Overlay Utility**

With Overlay Utility, you can create electronic overlays on the AS/400 to be used in AFP applications. Overlay Utility works on any AS/400 terminal, and provides an integrated platform to design, create, and print overlays.

- **Print Format Utility**

Print Format Utility is an interactive tool for building AFP output directly from the AS/400 database, without writing any application programs. With Print Format Utility, you can quickly create complex electronic output combining variable data, overlays, bar coding, images, and other document elements.

- **Resource Management Utility**

Resource Management Utility is a tool to manage the overlay and page segment resources used in AFP applications. With Resource Management Utility, you can create, copy, convert, and print these resources.

- **AFP Font Collection**

The previous AFP Font Collection (5648-113), which contained fonts for MVS, OS/390, VM and VSE operating systems and the AIX, AS/400, and OS/2 operating systems, has been separated into two products:

- **IBM AFP Font Collection for MVS, OS/390, VM, and VSE (5648-B33)**

provides AFP Expanded Core Fonts for the MVS, OS/390, VM, and VSE operating systems.

- **IBM AFP Font Collection for AIX, AS/400, and OS/2 (5648-B45)**

provides AFP Expanded Core fonts for AIX, OS/400, and OS/2 operating systems, as well as Compatibility fonts, DBCS outline fonts, and OS/2 font utilities.

These font collection products include the following enhancements:

- **Euro currency symbol:** the euro currency symbol has been added to all Latin1 fonts. AFP Font Collection includes new code pages and coded fonts to enable you to access the euro character.
- **Thai and Lao languages support:** complete core interchange font support for the Thai and Lao languages has been added.

Note: Please refer to the *IBM AFP Fonts: Font Summary for AFP Font Collection*, S544–5633, for more information about the euro currency symbol and the language support for Thai and Lao.

- **IBM AFP Printer Driver for Windows**

The IBM AFP Printer Driver for Windows creates AFP documents, overlays, and page segments from any Windows application. The AFP data stream can be sent directly to any PSF/2 attached printer, uploaded for printing on the AS/400, or sent to a file for viewing on the Client Access/400 Viewer. You can also use the IBM AFP Printer Driver for Windows to create electronic overlays and page segments for use in your AS/400 AFP documents.

- **Cooperative Development Environment/400 (CODE/400)**

CODE/400 and VisualAge for RPG provide a fully-graphical development platform for AS/400 client and server applications. CODE/400 enables you to design application output pages graphically. The CODE/400 design is stored as AS/400 printer file DDS.

- **Report Layout Utility (RLU)**

RLU is an interactive design tool to build DDS output. RLU, a part of Application Development Tools, is similar to Screen Design Aid (SDA), but is used with printer files.

- **Business Graphics Utility (BGU)**

BGU is an interactive utility for developing graphical data such as graphs and pie charts. The output of BGU, a graphic data file, can be used within an AFP document.

- **Graphical Data Display Manager (GDDM)**

GDDM is a set of programming routines that can be used to generate graphical data directly from a high-level program. The output of GDDM, a graphic data file, can be then be used with AFP output.

- **Non-IBM Applications**

There are a wide variety of non-IBM applications that enable AFP. They include systems for electronic forms design and output formatting. There are tools for each type of AFP print resource: fonts, image, and overlays. There are systems that merge existing application output with these resources to create electronic output. Examples include:

- Form, font, image, and application builder from ISIS
- Form, font, image, and application builder from Elixir Technologies
- Check and application builder from Digital Designs (Electroform/400)
- Form and application builder from OPTIO Corporation (Forms Xpress)
- Form system from Mips Dataline (Transform/400)

Complementary Applications

- **Client Access/400 (CA/400)**

CA/400 is a program that enables you to connect AS/400 systems and personal computers. CA/400 offers a set of OS/400 database, file, and print services for Windows, DOS, and OS/2. CA/400 also includes many base enablers for client server application development. CA/400 integrates the AFP Workbench for OS/2 and Windows to provide a high-function client interface to AS/400 output. You can view any spooled file fully and graphically, including AFP output. Once viewed, output can be searched, faxed, and printed.

- **OfficeVision/400 (OV/400)**

OfficeVision/400 provides a set of office functions that include full document entry, management, and document merge with database files. OV/400 can imbed image and graphic files within a document. OV/400 can also add electronic overlays (for example, electronic letterhead) to a document.

- **Facsimile Support for AS/400**

FAX/400 enables you to use facsimile, or fax, directly from an AS/400 system. FAX/400 is a generalized facsimile enabler for both inbound and outbound faxes. It enables you to integrate your facsimile transmissions directly into your applications.

Incoming faxes can be viewed using Client Access/400 or printed on IPDS printers. Any AS/400 spooled file can be faxed outbound. Facsimile Support also supports AFP overlays as fax cover sheets.

- **ImagePlus/400**

ImagePlus/400 enables you to turn paper documents into electronic images that then can be stored, viewed and printed. ImagePlus/400 provides the ability to electronically capture, import, index, store, retrieve, display, process, distribute, and print image information.

- **Workfolder Application Facility/400 (WAF/400)**

WAF/400 provides an application for document-driven workflow and folder management. WAF/400 also provides a set of APIs for the image enablement of business applications. WAF documents, being image-coded data, can be viewed with the Client Access/400 Viewer and printed on IPDS printers.

- **OnDemand for AS/400**

OnDemand enables you to store and retrieve large volumes of AS/400 data, such as spooled files. This data may be stored on disk, optical, and tape storage media. OnDemand provides the capabilities to index, store, search, retrieve, view, fax, and print output information.

- **Business Partner Applications**

The second category includes applications that work with or transform AFP data. These include report archive and retrieval systems that index, store, manage, and retrieve output files. These also include various print serving systems that route, transform and print AS/400 output.

- **Backup Recovery and Media Services (BRMS)**

Backup Recovery and Media Services (BRMS) for AS/400 provides backup, recovery, and archive services for tape devices. AS/400 objects, libraries, folders, spooled files, configurations, and integrated file system data can be saved, restored, and archived to tape. Output queues can be backed up, including external print resources (overlays, page segments) referenced in AFP spooled files.

- **Third Party Design Tools**

There are a number of tools that enable you to design and work with AFP resources, such as overlays, fonts, page segments, page definitions, and form definitions).

AFP Applications

The final category represents AS/400 line-of-business solutions that provide AFP electronic output. Applications that produce customer documents, such as invoices, purchases, and checks, are typical examples. Applications that require image, such as check image in bank statements and freight bills in transportation, are more specialized examples. As more and more customers move to electronic documents, there are more AS/400 applications that provide direct AFP support.

Chapter 5. Introduction to the Super Sun Seeds Case Study

Much of this document is devoted to describing how to move to electronic output, using Advanced Function Presentation. Because there are many approaches to building AFP applications, a single case study, the Super Sun Seeds invoicing application, will be used throughout.

Super Sun Seeds presently uses preprinted, multipart invoice forms, and produces an invoice document as shown in the following figure.


400 CPU Parkway Vegetation, NJ 55090		 Super Sun Seeds A Growth Company		Office: 555-499-2367 Fax: 555-415-9794	
[FIM] LOS ARBOLES DEL MUNDO 32483 ARBOL LANE MESA VERDE IL 65478-9390		SAME			
-- Sold To --		-- Ship To --			
Customer Number:	141	Invoice Number:	31341	Invoice Date:	7/28/95
				Payment Date:	8/28/95
Ship Via: Ship Date: 7/28/95 Terms: N10 Salesman: MICHELE GOODACRE					
Qty	UOM	Item #	Item Description	Price	Extension
1000	BX	56413213	POT POT	7.65	7,650.00
45	BZ	11005015	CHANTENAY SEEDS	2.19	98.55
900	EA	00001200	ARBOLES DEL SUR	45.00	40,500.00
98	PK	84512023	OREGON SPRING TOMATO SEED	.97	95.06
4	BX	11057893	AFRICAN DAISY, SEEDS	2.35	9.40
951	CT	11005011	LASSO RED SEEDS	892.23	48,510.73
46	DZ	11005014	SCARLET NANTES SEEDS	5.90	271.40
100	EA	31321655	SEMILLAS DEL SUS SOMBEROS	24.95	2,495.00
<p><i>Thank You</i> <i>Because almost half of</i> <i>your order was Lasso Red</i> <i>Seeds, you will receive</i> <i>a 10% discount on your</i> <i>next order.</i></p>					
Total Due					\$99,630.14
<p><i>Return this tear-off strip with your payment.</i> Payment is due by: 8/28/95 LOS ARBOLES DEL MUNDO 32483 ARBOL LANE MESA VERDE IL 65478-9390</p>					
<p><i>Make Checks Payable to:</i> Super Sun Seeds <i>Amount Due is:</i> \$99,630.14</p>					

Figure 14. Super Sun Seeds Preprinted Invoice

INVPRE Application Program Example

The application program producing the Super Sun Seeds invoice is INVPRE, shown in the following example.

```

5763PW1 V3R2M0 960917          SEU SOURCE LISTING    03/03/96 17:47:39    1
SOURCE FILE . . . . . SAMPLER/QRPGSRC
MEMBER . . . . . INVPRE
SEQNBR*...+... 1 ...+... 2 ...+... 3 ...+... 4 ...+... 5 ...+... 6 ...+... 7 ...+... 8
100      * INVPRE - Super Sun Seeds - Sample of a Preprinted Invoice
200      *
300      * This program reads a transaction file (SEEDDETL), retrieves info
400      * from item master (SEEDITEM) and customer master (SEEDCUST), then
500      * prints invoices.
600      *
700      * Invoice detail lines are processed until either end of customer order
800      * or lines=25, at which time the invoice page is printed. At end of
900      * order, a check is made to see if there are more than 18 detail lines
1000     * to print. If there are, that would not leave room in the invoice body
1100     * to print the customer offer. In this case, the page is printed, and a
1200     * new final page is built with the offer and the payment coupon.
1300     *
1400     * The offer is a message based on item sales in the customer master.
1500     *
1600     *
1700     FSEEDDETLIP E          K          DISK
1800     FSEEDITEMIF E         K          DISK
1900     FSEEDCUSTIF E         K          DISK
2000     FINVPRE  0  E          PRINTER
2100     *
2200     E                      WDS      1  40 24          Text for Offer
2300     *
2400     IINVCDETL    01
2500     I                      STNAME          32
2600     I                      CUST# L1
2700     ICUSTDATA    02
2800     IITEMDATA    03
2900     *
3000     IBARTOT      DS
3100     I                      1  60CUST#
3200     I                      7 152TOTDUE
3300     *
3400     IPAYDAA      DS
3500     I                      1  20PAYM0
3600     I                      3  40PAYDA
3700     I                      5  60PAYYR
3800     *
3900     C              *IN90    IFEQ '0'          First Pass Only
4000     C                      SETON          90
4100     C                      EXSR DATESR
4200     C                      ENDIF
4300     *
4400     * Start of customer order
4500     *
4600     C              *INL1    IFEQ '1'          Start Customer
4700     C              CUST#    ADD 31200      INVC#  60      Invent Invoice#
4800     C                      Z-ADD0      TOTDUE  92      Reset Totals/Ctrs
4900     C                      Z-ADD0      ITMCNT  30
5000     C                      Z-ADD0      PAGCNT  30
5100     C              CUST#    CHAINSEEDCUST          20
5200     C  32      MOVEL'      SAME'STNAME
5300     C                      Z-ADDZIP      ZIPPN  90
5400     C*
5500     C                      WRITEINVTOP
5600     C*
5700     C                      ENDIF

```

5800	C*					
5900	C* Detail Processing					
6000	C*					
6100	C	*IN01	CABNE'1'	ENDDDET		Item Processing
6200	C		ADD 1	ITMCNT		
6300	C	ITM1	CHAINSEEDITEM		21	
6400	C*					
6500	C	QTY1	MULT SELPRC	EXTPRC	72	
6600	C		Z-ADDQTY1	QTY	40	
6700	C	EXTPRC	ADD TOTDUE	TOTDUE		
6800	C*					
6900	C		WRITEDETLIN			Write Detail Line
7000	C*					
7100	* Check for end of space on page					
7200	*					
7300	C	ITMCNT	IFEQ 25			Full 1st Page
7400	C		ADD 1	PAGCNT		
7500	C		SETON		31	
7600	C		WRITEPAGEOF			Pg 1 of 2 Msg
7700	C		WRITEINVTOP			Invoice Heading
7800	C		SETOF		31	
7900	C		Z-ADD0	ITMCNT		
8000	C		ENDIF			
8100	C*					
8200	C	ENDDDET	TAG			
8300	C*					
8400	C* End of customer order					
8500	C*					
8600	CL1	ITMCNT	IFGT 18			No Room for Offer
8700	CL1		ADD 1	PAGCNT		
8800	CL1		SETON		31	
8900	CL1		WRITEPAGEOF			Pg 1 of n
9000	CL1		WRITEINVTOP			Invoice Heading
9100	CL1		SETOF		31	
9200	CL1		ENDIF			
9300	C*					
9400	C* Payment coupon fields					
9500	C*					
9600	CL1		MOVE BARTOT	BARPRC	150	Load Totals
9700	CL1		Z-ADDTOTDUE	TOTD@2	92	
9800	CL1		MOVE NAME	NAME@2	25	
9900	CL1		MOVE STREET	STRE@2	25	
10000	CL1		MOVE CITY	CITY@2	25	
10100	CL1		MOVE STATE	STAT@2	2	
10200	CL1		MOVE ZIP	ZIP@2	9	
10300	CL1		ADD 1	PAGCNT		
10400	C*					
10500	C* Write Offer					
10600	C*					
10700	CL1		EXSR OFFSR			
10800	CL1 30		WRITEOFFER			Write Offer and
10900	CL1		WRITEINVBOT			Invoice Totals
11000	CL1		SETOF		30	
11100	C*					
11200	C* Set up Date					
11300	C*					
11400	CSR	DATESR	BEGSR			
11500	CSR		Z-ADDUDAY	PAYDA		
11600	CSR	UMONTH	ADD 1	PAYMO		
11700	CSR	PAYMO	IFGT 12			
11800	CSR		Z-ADD1	PAYMO		
11900	CSR	UYEAR	ADD 1	PAYYR		
12000	CSR		ELSE			
12100	CSR		Z-ADDUYEAR	PAYYR		
12200	CSR		ENDIF			
12300	CSR		MOVE PAYDAA	PAYDAT	60	
12400	CSR		Z-ADDPAYDAT	PAYDA@	60	

```

12500      CSR                      ENDSR
12600      *
12700      * Set up Special Offer
12800      *
12900      CSR          OFFSR      BEGSR
13000      CSR          SLSSD      IFGE 500      Seeds
13100      CSR                      Z-ADD1      IX      20
13200      CSR                      SETON                      30
13300      CSR                      GOTO WRTOFR
13400      CSR                      ENDIF
13500      CSR          SLSFRT      IFGE 500
13600      CSR                      Z-ADD7      IX      30      Fruit
13700      CSR                      SETON                      30
13800      CSR                      GOTO WRTOFR
13900      CSR                      ENDIF
14000      CSR          SLSSUP      IFGE 500      Trees
14100      CSR                      Z-ADD13      IX      30
14200      CSR                      SETON                      30
14300      CSR                      GOTO WRTOFR
14400      CSR                      ENDIF
14500      CSR          SLSCHM      IFGE 500      Stuff
14600      CSR                      Z-ADD19      IX      30
14700      CSR                      SETON                      30
14800      CSR                      GOTO WRTOFR
14900      CSR                      ENDIF
15000      C*
15100      CSR                      GOTO ENDOFR
15200      C*
15300      CSR          WRTOFR      TAG
15400      CSR                      MOVE WDS,IX      OFFR@1 24      Build Offer Text
15500      CSR                      ADD 1      IX
15600      CSR                      MOVE WDS,IX      OFFR@2 24
15700      CSR                      ADD 1      IX
15800      CSR                      MOVE WDS,IX      OFFR@3 24
15900      CSR                      ADD 1      IX
16000      CSR                      MOVE WDS,IX      OFFR@4 24
16100      CSR                      ADD 1      IX
16200      CSR                      MOVE WDS,IX      OFFR@5 24
16300      CSR                      ADD 1      IX
16400      CSR                      MOVE WDS,IX      OFFR@6 24
16500      CSR          ENDOFR      ENDSR
16600      C*
16700      *
16800      ** WDS      WORDS FOR OFFER
16900      Thank You .....
17000      Because you have ordered
17100      over $500 of seeds this
17200      year, on your next seed
17300      order you will receive
17400      a 10% discount.
17500      Thank You .....
17600      Because you have ordered
17700      over $500 of fruit this
17800      year, on your next fruit
17900      order you will receive
18000      a 10% discount.
18100      Thank You .....
18200      Because you have ordered
18300      over $500 of trees this
18400      year, on your next tree
18500      order you will receive
18600      a 10% discount.
18700      Thank You .....
18800      Because you have ordered
18900      over $500 of stuff this
19000      year, on your next stuff
19100      order you will receive

```


19200 a 10% discount.
19300

* * * * * E N D O F S O U R C E * * * * *

INVPRE Application Program General Processing Flow

The general processing flow for INVPRE is as follows:

- Customer order line items (file SEEDDETL) are processed.
- At the beginning of each customer order, customer information is retrieved from the customer master (file SEEDCUST). This provides the bill to and ship to information for the top half of the invoice page.
- For each line item, item master information is retrieved from the item master (file SEEDITEM)
- Line extensions are calculated, and order totals are accumulated
- An invoice detail line is printed. The preprinted invoice accommodates up to 25 line items per page.
- If a customer order contains more than 25 line items, the message *Continued* is printed in the totals box, and the invoice is continued on the next form.
- At the end of a customer invoice, an optional sales offer may be printed based on that customer's sales history.
- Finally, the invoice total is printed at the bottom of the page in the form of a payment coupon.

The actual formatting and positioning of the output is done external to the application program, using Data Description Specifications (DDS) in the INVPRE printer file.

DDS Source for INVPRE Example

The INVPRE DDS is shown in the following example.

```
5763PW1 V3R2M0 960917          SEU SOURCE LISTING  03/03/96 17:48:16      1
SOURCE FILE . . . . . SAMPLER/QDDSSRC
MEMBER . . . . . INVPRE
SEQNBR*...+... 1 ...+... 2 ...+... 3 ...+... 4 ...+... 5 ...+... 6 ...+... 7 ...+... 8
100    A*  INVPRE: Sample of standard invoicing output used with
200    A*          preprinted forms.
300    A*
400    A*  Printer File Create or Change Parameters:
500    A*  - Printer Device Type (DEVTYPE)          *SCS
600    A*  - Overflow Line (OVRFLW)                 64
700    A*  - Front Overlay (FRONTOVL)               INVAL
800    A*
900    A*  Page 1 Header
1000   A*- includes Postnet Zip+4
1100   A*
1200   A          R INVTOP                          SKIPB(12)
1300   A          NAME                               25A      12
1400   A          STNAME                             25A      48
1500   A                                     SPACEA(1)
1600   A          STREET                             25A      12
1700   A          STSTRT                             25A      48
1800   A                                     SPACEA(1)
1900   A          CITY                               25A      12
2000   A          STCITY                             25A      48
2100   A                                     SPACEA(1)
2200   A          STATE                              2A       12
2300   A          ZIP                                9S       16 EDTWRD(' - ')
2400   A          STSTE                              2A       48
```

2500	A	STZIP	9S	52	EDTWRD(' - ')
2600	A				SPACEA(3)
2700	A	CUST#	6S 0	14	EDTCDE(Z)
2800	A	INVC#	6S 0	32	EDTCDE(Z)
2900	A			49	DATE EDTCDE(Y)
3000	A	PAYDAT	6S 0	66	EDTCDE(Y)
3100	A				SPACEA(2)
3200	A	SHPVIA	10A	14	
3300	A			34	DATE EDTCDE(Y)
3400	A	TERMS	10A	47	
3500	A	SLSMAN	16A	64	
3600	A				SPACEA(4)
3700	A*				
3800	A*	Detail Lines			
3900	A*				
4000	A	R DETLIN			
4100	A	QTY	4S 0	8	EDTCDE(Z)
4200	A	UOM	2A	13	
4300	A	ITEM#	8S 0	18	
4400	A	ITMDES	25A	28	
4500	A	SELPRC	6S 2	58	EDTCDE(J)
4600	A	EXTPRC	7S 2	70	EDTCDE(J)
4700	A				SPACEA(1)
4800	A*				
4900	A*	Multipage Message			
5000	A*				
5100	A	R PAGEOF			SKIPB(51)
5200	A			70	'Continued'
5300	A	PAGCNT	3S 0	73	EDTCDE(Z)
5400	A				SKIPB(63)
5500	A			65	'Page'
5600	A*				
5700	A*	Invoice Totals			
5800	A*				
5900	A	R INVBOT			SKIPB(51)
6000	A	TOTDUE	9S 2	67	EDTWRD(' , \$0. -')
6100	A				SPACEA(4)
6200	A	PAYDA@	6S 0	25	EDTCDE(Y)
6300	A	TOTD@2	9S 2	67	EDTWRD(' , \$0. -')
6400	A				SPACEA(2)
6500	A	NAME@2	25A	12	
6600	A				SPACEA(1)
6700	A	STRE@2	25A	12	
6800	A				SPACEA(1)
6900	A	CITY@2	25A	12	
7000	A				SPACEA(1)
7100	A	STAT@2	2A	12	
7200	A	ZIP@2	9A	16	
7300	A	PAGCNT	3S 0	73	EDTCDE(Z)
7400	A				SKIPB(63)
7500	A			65	'Page'
7600	A*				
7700	A*	Offer Print			
7800	A*	- Font 92 is Courier Italic 12-pitch			
7900	A*				
8000	A	R OFFER			SKIPB(43)
8100	A*				FONT(92)
8200	A	OFFR@1	24A	33	
8300	A				SPACEA(1)
8400	A	OFFR@2	24A	33	
8500	A				SPACEA(1)
8600	A	OFFR@3	24A	33	
8700	A				SPACEA(1)
8800	A	OFFR@4	24A	33	
8900	A				SPACEA(1)
9000	A	OFFR@5	24A	33	
9100	A				SPACEA(1)

```

9200      A          OFFR06      24A      33
9300      A
                                SPACEA(1)
                                * * * * E N D   O F   S O U R C E   * * * *

```

Considerations for Electronic Invoice Forms

Moving the Super Sun Seeds invoice to an electronic invoice involves choosing from a number of application enabling tools. That choice will be influenced, in part, by at least three factors, (1) the application requirements of the new invoice, (2) the characteristics of the current application, and (3) the skills available or required.

First, the new invoicing application may require:

- Changes in overall page layout
- Static or dynamic layout
- Single or multiformat pages
- Bar coding, images, and other document elements
- How copies are handled
- Certain processing or performance characteristics

Second, certain characteristics of the existing invoicing application, primarily access to source code, will be a factor.

Finally, skill requirements or preferences are a factor:

- Availability of programming skills
- Scope of electronic printing applications, that is, the number of applications, electronic forms, and so on

The following enabling approaches are discussed in this document:

- Printer file implementation
- Data Description Specifications (DDS)
- Page and form definitions
- Advanced Print Utility (APU)
- AFP Toolbox
- Print Format Utility (part of Advanced Function Printing Utilities for AS/400)
- Third party applications

All of these approaches create an electronic Super Sun Seeds document (Print Format Utility would be more suited to a related application, such as shipping labels). These new electronic invoice documents contain fonts, images, bar codes, and electronic forms. These building blocks of electronic printing applications are the subject of subsequent chapters in this document.

Printer file parameters provide you with an easy, automatic way to change to your output. For more information on Printer File parameters, see “Chapter 10. Using Printer Files” on page 115.

Computer output reduction (COR), multi-up reports, and front and back overlays are simple to implement.

DDS (Data Description Specifications) is the standard interface to the output page. DDS keywords provide complete and dynamic control of all page elements. DDS is integrated with the application program, enabling page content to be customized by

application data and program logic. For more information on DDS keywords, see "Chapter 11. Using Data Description Specifications" on page 127.

Advanced Print Utility (APU) is an interactive tool for transforming existing line-oriented application output to electronic pages, independent of the application program. A new document design is created interactively, and that design is applied to the output file created by the application. For more information on APU, see "Chapter 12. Using the Advanced Print Utility" on page 161.

Page and form definitions also provide application-independent document formatting. These definitions, created with Page Printer Formatting Aid (PPFA) or other document applications, are plugged directly into the printer file. This dynamically transforms existing line-mode output to complex electronic documents. For more information on page definitions and form definitions, see "Chapter 13. Using Page Definitions and Form Definitions" on page 193.

AFP Toolbox provides complete control over the AFP print data stream, using high-function objects and APIs. AFP Toolbox provides the programming interface to create critical, complex output - output with dynamic elements, image integration, indexing, or output data stream transformation. For more information on AFP Toolbox, see "Chapter 14. Using the AFP Toolbox for AS/400" on page 217.

Print Format Utility (PFU) creates electronic output directly from AS/400 database files, using an interactive user interface. PFU is well-suited to quick-turnaround applications and multi-up documents (such as bar coded labels). For more information on PFU, see "Chapter 15. Using the Print Format Utility" on page 225.

Chapter 6. Fonts

To represent text, you need fonts. A *font* is a complete set of graphic characters sharing the same type family, style, weight, and size. A font may include letters, numbers, punctuation marks and special characters. To add variety to your documents, you can include fonts of various sizes, styles, weights, and orientations.

This chapter describes AFP font usage on the AS/400 and includes the following:

- Font terminology
- Font data formats
- Location of the fonts
- AS/400 font objects
- AS/400 font products
- AS/400 libraries
- AS/400 font substitution
- Finding fonts

Font Terminology

Although thousands of typefaces exist (Courier, Helvetica, Prestige, and so on), there are only three basic types of fonts. These three font types classify fonts with similar characteristics based on font size and spacing. These font types are explained in the following sections.

Monospaced Fonts

Many typewriters and line printers use what are known as *monospaced* fonts. Synonyms for monospaced are fixed-pitch and uniformly spaced. Each character in a monospaced font has the same width and occupies the same print space. "Pitch", also known as characters per inch (CPI), is an old typewriter term and simply means the number of characters that can be printed in one inch of text. "Fixed-pitch" means that all the characters in the font have the same width and will occupy the same amount of space when printed, thus the name, monospaced. Monospaced fonts are typically used for tabular data where column alignment can be easily maintained. The larger the pitch value, the smaller the text because more characters can be printed in one inch.

Many printers have printer-resident monospaced fonts. These fonts may be either bitmaps or outlines.

Proportionally Spaced Fonts

Proportionally spaced fonts, sometimes called PS or PSM fonts, contain characters with widths assigned from one of seven width values. Narrow characters such as "i" and "l" print with less space than wider characters such as "m" and "A". All proportionally spaced fonts contain characters with widths assigned in a consistent manner so that an "i" in one font will be the same as an "i" in another.

Note: The PS font widths for most characters are given in Appendix B of the *Document Content Architecture: Final Form Text Reference* and in Appendix E of the *Document Content Architecture: Revisable Form Text Reference*.

The average spacing of a proportionally spaced font is 12 CPI (12 pitch).
Proportionally spaced fonts may be either bitmaps or outlines.

Typographic Fonts

Typographic fonts have variable character widths, but unlike proportionally spaced fonts, each character in each font is individually sized for readability. Typographic fonts are measured in points (1/72 of an inch), a vertical measurement expressing the font's size by height. Typographic fonts may be either bitmaps or outlines.

Generally, typographic fonts are considered more legible than monospaced fonts, and produce text that is more easily read. They can also be used to improve the appearance of a document and allow a greater number of characters to be printed on a page.

The following information can help you define a font.

Font Family Courier, Helvetica, Times Roman, and Sonoran Serif are examples of frequently used font families.

Typeface A typeface is similar to a typestyle. It also defines the shape of the characters, but it also includes their weight, posture, and size or point size.

- **Weight:** Defines the character weight such as medium or bold.
- **Posture:** Defines the character stance, such as normal or italic.
- **Size:** Defines the size of a fixed pitch font in characters per inch.
- **Point Size:** A vertical measurement used to define the relative size of a typographic font. One point equals 1/72 of an inch.

Font Resolution The number of pels (picture elements) printed per inch. Two resolutions, 240 dots per inch (DPI) and 300 DPI, are available as downloadable font resources. In addition, outline fonts are also available for download and as printer-resident fonts. Outline fonts can be used to print at any font resolution supported by the printer. To determine the resolution for a particular font character set, use the Work Font Resource (WRKFNTRSC) command.

Orientation All font character sets support four print orientations, 0, 90, 180, and 270 degrees. Other orientations can be printed if the text is created as image data or outline.

Character ID Also referred to as the graphic character ID, the character ID is an 8-byte character data string. Each character or symbol is assigned a unique character ID to distinguish the character from other characters. For example:

Character	Character ID
a	LA010000
A	LA020000
e	LE010000
é	LE110000
ê	LE150000
E	LE020000

É	LE120000
1	ND010000
2	ND020000
3	ND030000
- (Hyphen)	SA000000
- (Minus)	SP100000
\$	SC030000

Code point A code point is an 8-bit binary number representing one of 256 potential characters (the maximum number of characters available on a single-byte code page). Code points are usually shown as hexadecimal representations of their binary values. For example, an uppercase A (character ID LA020000) is represented by code point C1 for EBCDIC code page T1V10500 (see Figure 18 on page 59).

Typical examples of Sonoran typographic fonts are shown below:

Sonoran Serif
Sonoran Serif Bold

Sonoran Sans Serif Italic
Sonoran Sans Serif Italic Bold

Figure 15. Sonoran Font Examples. For samples of Courier, Helvetica, and Times New Roman, see “Appendix J. Font Samples” on page 353.

Figure 9 on page 32 shows several fonts used on the Super Sun Seeds invoice example. These fonts are:

FONT 1	Times New Roman 10-point (character set C0N30000)
FONT 2	Courier 10-pitch (FGID 11)
FONT 3	Gothic Roman Semi-Light (character set C0D0GC15)
FONT 4	Courier Italic (FGID 92)
FONT 5	Times New Roman Italic Bold 10-point (character set C0N40000)

Font Data Format

Fonts are provided in two data formats—as raster fonts or as outline fonts

Raster Fonts

A raster font defines characters by means of bit patterns. Each bit pattern has a specific size, weight, style, and resolution. Figure 16 on page 54 illustrates two font characters formed by raster patterns. The character on the right contains more pels

(picture elements), meaning that it has a higher resolution than the character on the left.

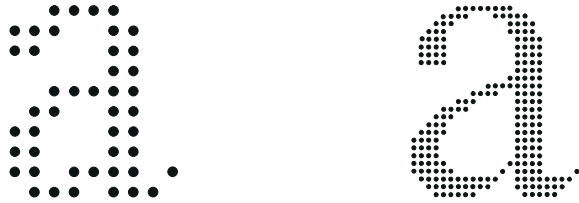


Figure 16. Raster Font Characters with Different Resolutions

A different raster font must be created for each specific resolution and size required. For example, for the font family Helvetica, there is a bitmap for the letter A (Roman medium) in each point size, as well as bitmaps for the following in each point size:

- A** (Roman bold)
- A* (italic)
- A*** (italic bold),

If we assume that each style and weight is available in point sizes 6 through 12, 14, 16, 20, 24, 30, and 36, then the capital letter A in the Helvetica font family is stored as 52 different bitmaps. The Helvetica font family contains more than 400 different characters, each of which is represented by 52 bitmaps.

Outline Fonts

An outline font, as the name suggests, defines each character in terms of its outline, using mathematical formulas to define each character's shape. A rasterizer interprets the data and fills in the outline with dots creating a bitmap of the character for the specified point size and print resolution.

Many outline fonts are defined in Adobe Type 1 font format, and are available from many font vendors. The outline fonts available from IBM for AS/400 are Adobe Type 1 fonts encapsulated in an AFP wrapper so they can be handled as AFP font resources. Type Transformer, an OS/2 program provided as an option of AFP Font Collection, can be used to create 240-pel, 300-pel, and AFP outline fonts from Adobe Type 1 input.

Adobe has been producing digital fonts since 1984, licensing fonts from font foundries such as Linotype and ITC, as well as designing its own. The Adobe Type library is now in excess of 10 000 fonts and is claimed to be the largest collection of typefaces in the same format ever assembled.

The outline fonts from IBM define characters using a 1000 x 1000 matrix (1000 Adobe units). The outlines are size and resolution independent and can be scaled to a particular resolution and point size and transformed to a particular resolution, style, rotation, and point size.

Location of the Fonts

Fonts are either resident in the printer or downloadable from your AS/400 system. This section explains how you can use these two types of fonts.

Printer-Resident Fonts

Many printers contain printer-resident fonts. These fonts may be bitmaps or outlines and can vary by printer type and manufacturer. The printer hardware manual should be referenced to determine the printer's resident font support. In order to ensure document fidelity across various printer types, it will be necessary to use the same fonts on each printer. If a font is selected and not resident on the target printer, a font substitution may occur (see "AS/400 Font Substitution" on page 67) resulting in output differing from printer to printer.

Fonts found in IBM's AFCCU printers are the same as those found as host-resident fonts provided with AFP Font Collection. This means that printer-resident fonts and downloaded bitmap fonts may be interchanged in a print environment where both outline font and bitmap printers exist.

Host-Resident Fonts

AFP host-resident fonts reside on the host system in font libraries, and they can be downloaded to IPDS printers attached to your system. The transfer of the font data is performed automatically by Print Services Facility (PSF/400, PSF/MVS, PSF for OS/390, PSF/VM, PSF/VSE, PSF/2, or PSF for AIX).

When you add a new font to the system, any printer that supports downloadable fonts and matches the resolution of the font is immediately able to use it if requested by the application.

Captured Fonts

In the past, PSF/400 saved downloaded fonts across spooled files, but not across instances of the writer. It is now possible with PSF/400 V4R2 for the printer (if the printer supports this function) to dynamically "capture," or cache, a host-downloaded font. The captured font then appears like a printer-resident font, even when the printer has been powered off. Network traffic is reduced by eliminating subsequent font downloads to the printer.

Currently, some IBM printers support font capturing, while others do not.

Note: Because improper use of font capturing may cause unpredictable results, it is strongly advised that only system administrators handle the font capture feature. Carefully study *IBM AS/400 Printer Device Programming* (SC41-5713) before proceeding so that you are aware of the proper use of font capturing.

The new parameter FNTCAPTURE has been added to the PSF configuration object (CRT/CHG/DSP/PSFCFG) commands to activate font capturing. If you configure FNTCAPTURE as *YES, then any fonts eligible to be captured will be captured.

To mark a font as eligible to be captured, specify the name of a font character set or code page, and select FNTCAPTURE (*YES) in the font resource (CRT/CHGFNTRSCA) command.

Captured fonts remain in the printer as long as there is space for them (until the space they occupy is needed for something else). To avoid security problems, do **not** mark sensitive fonts, such as signatures and MICR fonts, as eligible to be

captured. You cannot clear a captured font from the printer, so it is possible that an unauthorized person could access the captured font.

AS/400 Font Objects

The AFP font objects supported on the AS/400 system are described in the following sections.

Code Page, Character Set, and Coded Font Overview

In IBM font structure, a *code page* maps each character of text to the characters in a *character set* (see Figure 17). As you enter your text at a workstation, each keyboard character is translated into a code point. When the text is printed, each code point is matched to a character ID on the code page you specify. The character ID is then matched to the image (raster pattern or outline pattern) of the character in the character set you specify. The image in the character set is the image that is printed in your text.

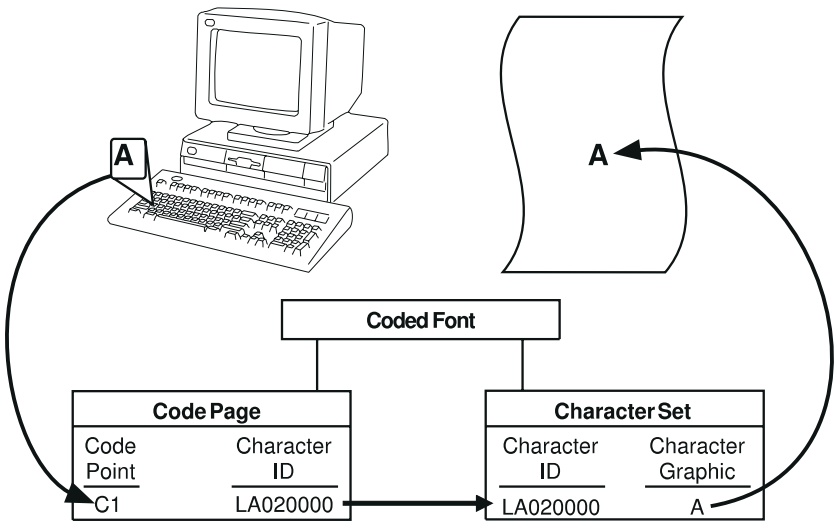


Figure 17. Translation of a Keyboard Character into a Printed Character

Fonts may be selected by selecting the character set and code page. A short cut method used by some applications is the coded font which contains a predefined character set/code page pair.

Character Sets

A character set is the collection of characters contained in a font. It contains character identifiers and corresponding character patterns (raster or outline) for a single type family, typeface, and (in the case of rasters), type size. In addition, a font character set specifies character properties and printing attributes.

Character sets include alphabetic, numeric, and special characters. Each national language has the alphabetic and numeric characters required by that language and by national standards. Each language has its unique requirements and may not use the same characters in the same way another language does.

A character set is an object located in a font library. The object type for a character set is *FNTRSC and the attribute is FNTCHRSET. See section "AS/400 Font Products" on page 61 to determine what character sets are available.

"Appendix J. Font Samples" on page 353 provides samples of the most widely used fonts: Helvetica, Times New Roman, and Courier. These samples also reference the character set resource name. For example, Helvetica Roman-Bold 20-point is character set C0H400J0. Most of the AS/400 font character sets use a common resource nomenclature, as follows:

C0fs0cpp is the font character set name

Where the "C0" prefix designates a character set and the rest of the font character set name structure is decoded as follows:

f Font Family:

- *Example:* N is Times New Roman
- *Example:* H is Helvetica
- For a complete list, refer to *IBM AFP Font Summary*, G544-3810, or *IBM AFP Font Summary for AFP Font Collection*, S544-5633

s Font Style:

- 2: Roman Medium
- 3: Italic Medium
- 4: Roman Bold
- 5: Italic Bold

c Language complement:

- *Example:* 0 is Latin 1
- *Example:* 1 is Symbols
- For a complete list, refer to *IBM AFP Font Summary*, G544-3810, or *IBM AFP Font Summary for AFP Font Collection*, S544-5633

pp Point Size:

- 60: 6-point
- 70: 7-point
- 80: 8-point
- 90: 9-point
- 00: 10-point
- A0: 11-point
- B0: 12-point
- D0: 14-point
- F0: 16-point
- H0: 18-point
- J0: 20-point
- N0: 24-point
- T0: 30-point
- Z0: 36-point

For more information on character set naming, refer to *IBM AFP Fonts Summary* (G544-3810), *IBM AFP Fonts: Technical Reference for IBM Expanded Core fonts* (S544-5228), and *ABOUT TYPE: IBM's Technical Reference for 240-Pel Digitized Type* (S544-3516).

Code Pages

Character information can be represented in computers by one or more bytes of binary information called *code points*. Graphic characters are assigned to code points and form the link between code points and character data found in the character sets. Characters are generally assigned according to two encoding schemes: American Standard Code for Information Interchange (ASCII) and Extended Binary Coded Decimal Interchange Code (EBCDIC).

For languages that are not alphabet-based, double-byte character set (DBCS) encoding is used. For example, DBCS is used for Japanese, Chinese, and Korean languages because they are ideographic in nature and contain an extremely large number of characters. Other languages can be represented by a single-byte character set (SBCS).

For single byte EBCDIC character sets, 192 bit combinations in a byte (hexadecimal X'40' through X'FF') are available to represent characters. Code points below hexadecimal X'40' are generally reserved for printer commands. Character sets usually contain more characters than individual code pages, so many different code pages can be used to select characters from a single character set.

For the different code pages supported on the AS/400 system, refer to the *National Language Support Planning Guide*. For code pages provided with the IBM AFP Font Collection products, see *IBM AFP Font Summary*, G544-3810, or *IBM AFP Font Summary for AFP Font Collection*, S544-5633.

Code pages are objects located in font libraries. The object type is *FNTRSC and the attribute is CDEPAG. See section "AS/400 Font Products" on page 61 to determine which code pages are available.

Figure 18 on page 59 shows an example of a code page.

Country Extended: International #5

T1V10500

CPGID: 500

GCSGID: 697

Undefined code point: SP010000

Hex Codes 1st → 2nd ↓	4-	5-	6-	7-	8-	9-	A-	B-	C-	D-	E-	F-
-0	SP010000	SM030000	SP100000	LO610000	LO620000	SM190000	SM170000	SC040000	SM110000	SM140000	SM070000	ND100000
-1	SP300000	LE110000	SP120000	LE120000	LA010000	LJ010000	SD190000	SC020000	LA020000	LJ020000	SA050000	ND010000
-2	LA150000	LE150000	LA160000	LE160000	LB010000	LK010000	LS010000	SC050000	LB020000	LK020000	LS020000	ND020000
-3	LA170000	LE170000	LA180000	LE180000	LC010000	LL010000	LT010000	SD630000	LC020000	LL020000	LT020000	ND030000
-4	LA130000	LE130000	LA140000	LE140000	LD010000	LM010000	LU010000	SM520000	LD020000	LM020000	LU020000	ND040000
-5	LA110000	LE110000	LA120000	LE120000	LE010000	LN010000	LV010000	SM240000	LE020000	LN020000	LV020000	ND050000
-6	LA190000	LE190000	LA200000	LE160000	LF010000	LO010000	LW010000	SM250000	LF020000	LO020000	LW020000	ND060000
-7	LA270000	LE170000	LA280000	LE180000	LG010000	LP010000	LX010000	NF040000	LG020000	LP020000	LX020000	ND070000
-8	LC410000	LI130000	LC420000	LI140000	LH010000	LQ010000	LY010000	NF010000	LH020000	LQ020000	LY020000	ND080000
-9	LN190000	LS610000	LN200000	SD130000	LI010000	LR010000	LZ010000	NF050000	LI020000	LR020000	LZ020000	ND090000
-A	SM060000	SM080000	SM650000	SP130000	SP170000	SM210000	SP030000	SM660000	SP320000	ND011000	ND021000	ND031000
-B	SP110000	SC030000	SP080000	SM010000	SP180000	SM200000	SP160000	SM130000	LO150000	LU150000	LO160000	LU160000
-C	SA030000	SM040000	SM020000	SM050000	LD630000	LA510000	LD620000	SM150000	LO170000	LU170000	LO180000	LU180000
-D	SP060000	SP070000	SP090000	SP050000	LY110000	SD410000	LY120000	SD170000	LO130000	LU130000	LO140000	LU140000
-E	SA010000	SP140000	SA050000	SA040000	LT630000	LA520000	LT640000	SD110000	LO110000	LU110000	LO120000	LU120000
-F	SP020000	SD150000	SP150000	SP040000	SA020000	SC010000	SM530000	SA070000	LO190000	LY170000	LO200000	

Figure 18. EBCDIC Code Page T1V10500

Coded Fonts

A single-byte coded font associates a specific code page with a specific font character set. A single-byte coded font contains a combination of code page and font character set. For example, coded font X0BIR1 uses the character set C0S0BITR with code page T1V10037.

A double-byte font, such as Kanji, contains more than one code page and character set pair. Each pair is called a coded-font section. A double-byte coded font requires a 2-byte code in the text for each graphic character: the first byte identifies the section, and the second byte identifies the code point.

Coded fonts are font objects kept in the font libraries. The object type is *FNTRSC and the attribute is CDEFNT. See section "AS/400 Font Products" on page 61 to determine which coded fonts are available.

AS/400 supports both printer-resident and host-resident fonts. These fonts can be referenced by Font Global Identifier (FGID), by character set and code page, or by coded font name. Printers with resident fonts use FGIDs to access the resident fonts.

Font Global Identifier (FGID)

FGIDs are whole numbers from 1 to 65534 registered within IBM and used to identify font resources. FGIDs are assigned to unique type family/typeface combinations, such as Courier Roman Medium (FGID 11).

Ranges of FGID numbers can be used to identify the font type and size as follows:

FGID	Font Type and Size
1-65	Monospaced 10 characters per inch
66-153	Monospaced 12 characters per inch
154-200	Proportional (averages 12 characters per inch)
201-210	Monospaced 13.5 characters per inch
211-239	Monospaced 15 characters per inch
240-246	Monospaced 5 characters per inch
247-257	Monospaced 17.1 characters per inch
258-259	Monospaced 18 characters per inch
260-273	Monospaced 8.55 characters per inch
274-279	Monospaced 17.1 characters per inch
280-284	Monospaced 20 characters per inch
285-289	Monospaced 25 characters per inch
290-299	Monospaced 27 characters per inch
2304-3839	Typographic based on specified point size
4096-65279	Typographic based on specified point size

You can find a complete list of family names, typefaces, attributes, and size of each FGID in *IBM AS/400 Printer Device Programming*.

AS/400 Font Products

On the AS/400, two sets of fonts—the AFP Compatibility fonts and the GDDM (Graphical Data Display Manager) fonts—are included in the base system. Other font products, such as the AFP Font Collection, are available and can be purchased separately. These font products provide additional font choices beyond the basic fonts. The various AS/400 font products are described in this section.

AFP Compatibility Fonts

Since OS/400 Version 2 Release 1, an option called *OS/400 - AFP Compatibility Fonts* has been included free of charge in the AS/400 base operating system. It can be installed as an option on any AS/400 system.

The AFP Compatibility Fonts include both uniformly spaced and mixed-pitch type families at 240-pel resolution. The following font families are included: APL, Boldface, Courier, Document, Essay, Format, Gothic, Letter Gothic, Orator, Prestige, Roman, Script, Serif, Symbols, and Text. The AFP Compatibility fonts are downloadable 240-pel raster fonts and are installed in font library QFNTCPL.

Beginning with OS/400 Version 2 Release 2, additional uniformly spaced and typographic families were included. Some of these additional fonts emulate resident fonts on the IBM Proprinter, while others allow printing symbols.

A 300-pel version of the AFP Compatibility fonts is provided in the AFP Font Collection product.

AFP Font Collection

Three IBM font groups that can be used with Advanced Function printers are included in IBM AFP Font Collection for OS/400 (5648–B45):

- IBM Expanded Core Fonts (240-pel, 300-pel, and AFP outlines)
- AFP Compatibility Fonts (240-pel and 300-pel)
- DBCS Core Fonts

The AFP Font Collection provides a variety of typefaces that can be installed on all IBM operating system platforms. The OS/2 Fonts and Programs CD-ROM contains font utilities that allow you to create and modify fonts for any platform, including AS/400. The utilities are summarized as follows:

- **SBCS Type Transformer:** Creates AFP font character sets and coded fonts using Adobe Type 1 outlines as input. You can create 240-pel fonts, 300-pel fonts, and AFP outline fonts with this program. As part of the transform process, you can be selective in choosing which characters are to be included in the output fonts so that font storage requirements can be reduced.
- **DBCS Type Transformer:** Use this batch program to create AFP 240-pel rasters and AFP outlines from the Adobe CID format outlines provided on the OS/2 CD-ROM.
- **FontLab:** This is a Type 1 outline font editor that can be used to create or modify any Type 1 outline font character. FontLab can also be used to create User Defined Characters (UDCs) for DBCS environments.

- **Code Page Editor:** Code page editing consists of code point assignments, character identifier assignments, and global code page control information.
- **Coded Font Editor:** Coded font editing consists of character set and code page assignments. The point size can also be specified for coded fonts used with AFP outline character sets.

IBM Expanded Core Fonts

IBM provides the Expanded Core fonts to establish a common set of fonts that can be printed by any supported AFP printer in any IBM operating system environment. The IBM Expanded Core fonts are recommended because they provide:

- Consistent page layouts between 240-pel, 300-pel, and outline font printers
- Consistent document interchange between operating system platforms
- Support for many national languages

The IBM Expanded Core Fonts include the following font families: Boldface, BookMaster fonts (including IBM Logo fonts), Courier, Courier APL2, Gothic Katakana, Gothic Text, Helvetica, Letter Gothic, OCR-A, OCR-B, Prestige, and Times New Roman.

The Expanded Core fonts provide characters that support the following language groups:

Latin1	This group includes Danish, Dutch, English, Faeroese, Finnish, French, German, Icelandic, Irish, Italian, Norwegian, Portuguese, Spanish, and Swedish.
Latin2	This group includes Albanian, Czech, English, German, Hungarian, Polish, Romanian, Serbocroatian, Slovak and Slovenian.
Latin3	This group includes Afrikaans, Catalan, Dutch, English, Esperanto, French, German, Italian, Maltese, Spanish, and Turkish.
Latin4	This group includes Danish, English, Estonian, Finnish, French, German, Greenlandic, Lapp, Latvian, Lithuanian, and Norwegian.
Latin5	This group includes Danish, Dutch, English, Finnish, French, Irish, Italian, Norwegian, Portuguese, Spanish, Swedish, and Turkish.
Latin/Cyrillic	This group includes Bulgarian, Byelorussian, Macedonian, Russian, Serbian, Ukrainian, and English
Latin/Greek	This group includes characters for the Latin and Greek scripts.
Latin/Arabic	This group includes characters for the Latin and Arabic scripts.
Latin/Hebrew	This group includes characters for the Latin and Hebrew scripts.
Lao	This group contains characters for the Latin and Lao scripts.
Thai	This group contains characters for the Latin and Thai scripts.
Symbols	This set of fonts contains various symbols, including some that are letters.

Note: The AS/400 Core Interchange Font feature was discontinued in May, 1995, however you can continue using those fonts on any AS/400 system with OS/400 Version 2, 3, or 4.

AFP Compatibility Fonts

The 240-pel AFP Compatibility fonts provided with AFP Font Collection are identical to those that come free with the OS/400 base system. 300-pel versions of these fonts are also provided.

DBCS Core Fonts

The DBCS Core fonts are also provided as part of AFP Font Collection and are found in the OS/2 Fonts and Programs CD-ROM. The DBCS Core fonts are found on the OS/2 Fonts and Programs CD-ROM provided for the OS/2 environment. Facilities exist on the CD-ROM for uploading these fonts from OS/2 to the AS/400. See the *Type Transformer User's Guide*, G544-3796, for more information. Included on the OS/2 Fonts and Programs CD-ROM are the following font families: Fang Song, Hei, Kai, and Song (Simplified Chinese), Kai and Sung (Traditional Chinese), Heisei Kaku Gothic, Heisei Maru Gothic, Heisei Mincho (Japanese), and Gothic and Myengjo (Korean). For more information on these DBCS fonts, see the appropriate technical reference for the DBCS fonts (for example, AFP Font Collection: Japanese Technical Reference.)

There are two other DBCS font offerings provided for AS/400. One is AFP DBCS Fonts/400, which provides 240-pel DBCS font support. Another is a no-cost RPQ, IBM CJK Metric-Only Fonts (8A8080), which contains font metric files that can be used to access printer-resident outlines in AFCCU printers in which the DBCS feature has been installed.

AFP Fonts/400

This is an older package of AS/400 fonts (program number 57xx-FNT) that contains 240-pel, typographic fonts in sizes ranging from four to 72 points. See "Appendix K. AFP Fonts for AS/400" on page 363 for a complete list of the fonts contained in this package.

GDDM Fonts

An option called *OS/400 - GDDM* is included free of charge in the AS/400 base operating system and can be optionally installed on any AS/400 system. If the option is installed, you can find a list of graphic symbol sets in the library QGDDM (look for object type *GSS). You can use these fonts in printer files, in DDS, and with the optional licensed program AS/400 Business Graphic Utility (5763-BG1). They work on any IPDS printer that supports GOCA.

GDDM has two types of graphic fonts:

Vector symbol sets

These are identified by an object attribute *VSS. Each character is built with a set of straight or curved lines.

Image symbol sets

These are identified by an object attribute *ISS. Each character is a pattern of dots quite similar to FGID, except that some graphic characteristics apply.

Note: Image symbols are not supported in DDS.

GDDM fonts are scalable fonts, and can best be used for printing larger characters. For more information about GDDM, or for the font naming conventions, see the *AS/400 Programming Guide Version 3*.

Other AS/400 Font Offerings

There are two other font offerings available for AS/400 AFP users.

Postal Bar Codes, RPQ 8A5043

This font offering provides fonts for printing ZIP, ZIP + 4 and POSTNET bar codes, Facing Identification Marks (FIMs), and the Business Reply Bar.

AFP MICR Fonts, RPQ 8A8083

This font offering provides MICR fonts necessary for printing on IBM MICR printers.

AS/400 Font Libraries

The following list describes the system font libraries.

QFNTCPL	This library is shipped with the operating system. (Look for OS/400 - AFP Compatibility Fonts in your licensed program list.) This library contains the 240-pel compatibility set of fonts.
QFNT01-QFNT19	QFNT01-QFNT15 are used if you purchase and install certain OS/400 single-byte character set font licensed program products. These libraries contain only 240-pel fonts.
QFNT61-QFNT69	QFNT61-QFNT65 are used if you purchase and install certain OS/400 double-byte character set font licensed program products. These libraries contain only 240-pel fonts.

The IBM AFP Font Collection contains libraries that can be restored into system font libraries. The AFP Font Collection libraries are:

QFNTCDEPAG	Expanded code pages
QFNTCPL	240-pel Compatibility fonts
QFNTCF_ARA	Arabic coded fonts
QFNTCF4ARA	4-character Arabic coded fonts
QFNT240ARA	240-pel Arabic character sets
QFNT300ARA	300-pel Arabic character sets
QFNT300CPL	300-pel Compatibility fonts
QFNTCF_CYR	Cyrillic Greek coded fonts
QFNTCF4CYR	4-character Cyrillic Greek coded fonts
QFNT240CYR	240-pel Cyrillic Greek character sets
QFNT300CYR	300-pel Cyrillic Greek character sets
QFNTCF_HEB	Hebrew coded fonts
QFNTCF4HEB	4-character Hebrew coded fonts

QFNT240HEB	240-pel Hebrew character sets
QFNT300HEB	300-pel Hebrew character sets
QFNTCF_OCR	OCR coded fonts
QFNTCF4OCR	4-character OCR coded fonts
QFNT240OCR	240-pel OCR character sets
QFNT300OCR	300-pel OCR character sets
QFNTCF_APL	APL coded fonts
QFNTCF4APL	APL 4-character coded fonts
QFNT240APL	240-pel APL character sets
QFNT300APL	300-pel APL character sets
QFNTCF_KAT	Katakana coded fonts
QFNTCF4KAT	Katakana 4-character coded fonts
QFNT240KAT	240-pel Katakana character sets
QFNT300KAT	300-pel Katakana character sets
QFNTCF_LA1	Latin1 coded fonts
QFNTCF4LA1	4-character Latin1 coded fonts
QFNT240LA1	240-pel character sets for typographic fonts (i.e., Helvetica, Times New Roman)
QFNT300LA1	300-pel character sets for typographic fonts (i.e., Helvetica, Times New Roman)
QFNTCF_LA2	Latin2/3/4/5 coded fonts
QFNTCF4LA2	4-character Latin2/3/4/5 coded fonts
QFNT240LA2	240-pel Latin2/3/4/5 character sets
QFNT300LA2	300-pel Latin2/3/4/5 character sets
QFNTCF_SYM	Symbols coded fonts
QFNTCF4SYM	4-character Symbols coded fonts
QFNT240SYM	240-pel Symbols character sets
QFNT300SYM	300-pel Symbols character sets
QFNT240LAO	240-pel Lao character sets
QFNT300LAO	300-pel Lao character sets
QFNTCF_LAO	Lao coded fonts
QFNTCF4LAO	4-character Lao coded fonts
QFNTOLNLAO	Lao AFP outlines
QFNTCFOLAO	Coded fonts for Lao AFP outlines
QFNTCO4LAO	4-character coded fonts for Lao outlines
QFNTCF_TAI	Thai coded fonts
QFNTCF4TAI	4-character Thai coded fonts
QFNT240TAI	240-pel Thai character sets

|	QFNT300TAI	300-pel Thai character sets
|	QFNTOLNTAI	Thai AFP outlines
|	QFNTCFOTAI	Coded fonts for Thai AFP outlines
|	QFNTCO4TAI	4-character coded fonts for Thai outlines
	QFNT240BM	240-pel BookMaster character sets
	QFNT300BM	300-pel BookMaster character sets
	QFNTOLNAPL	APL AFP outlines
	QFNTCFOAPL	Coded fonts for APL AFP outlines
	QFNTCO4APL	4-character coded fonts for APL AFP outlines
	QFNTOLNARA	Arabic AFP outlines
	QFNTCFOARA	Coded fonts for Arabic AFP outlines
	QFNTCO4ARA	4-character coded fonts for Arabic AFP outlines
	QFNTOLNBM	BookMaster AFP outlines
	QFNTOLNCYR	Cyrillic Greek AFP outlines
	QFNTCFOCYR	Coded fonts for Cyrillic Greek AFP outlines
	QFNTCO4CYR	4-character coded fonts for Cyrillic Greek AFP outlines
	QFNTOLNHEB	Hebrew AFP outlines
	QFNTCFOHEB	Coded fonts for Hebrew AFP outlines
	QFNTCO4APL	4-character coded fonts for Hebrew AFP outlines
	QFNTOLNKAT	Gothic Katakana AFP outlines
	QFNTCFOKAT	Coded fonts for Gothic Katakana AFP outlines
	QFNTCO4KAT	4-character coded fonts for Gothic Katakana AFP outlines
	QFNTOLNLA1	Latin1 AFP outlines
	QFNTCFOLA1	Coded fonts for Latin AFP outlines
	QFNTCO4LA1	4-character coded fonts for Latin1 AFP outlines
	QFNTOLNLA2	Latin2/3/5 AFP outlines
	QFNTCFOLA2	Coded fonts for Latin2/3/5 AFP outlines
	QFNTCO4LA2	4-character coded fonts for Latin2/3/5 AFP outlines
	QFNTOLNOCR	OCR AFP outlines
	QFNTCFOOCR	Coded fonts for OCR AFP outlines
	QFNTCO4OCR	4-character coded fonts for OCR AFP outlines
	QFNTOLNSYM	Symbols AFP outlines
	QFNTCFOSYM	Coded fonts for Symbols AFP outlines
	QFNTCO4SYM	4-character coded fonts for Symbols AFP outlines

240 and 300 pel fonts can be in the same library if they have unique names. If you have the same font with the same name at both 240 and 300 pel, they need to be in separate libraries because you cannot have two entries with the same name in a library.

AS/400 Font Substitution

The AS/400 tries to print your file even if it does not have the specific font you have requested. Through the process of font substitution, the AS/400 tries to substitute a font that will produce similar, if not exact, results. (If you have selected *ABSOLUTE for the FIDELITY parameter, the match for font substitution must be exact or nothing will print.)

If the target printer supports printer-resident fonts, and the requested font is resident in the printer, no substitution will take place and the print job will continue. If the printer supports resident fonts, but does not contain the requested font, a substitute font will be used. For example, if Letter Gothic (FGID 87) is requested, but not resident, a host font from the font substitution tables will be selected and downloaded to the printer. In this example, the Letter Gothic bitmap character set C0S0LR12 will be selected and downloaded.

If the requested font is a host font, the font is specified either by font character set or coded font. If the printer does not support downloaded fonts (impact printers for example), and a matching printer-resident font exists, the matching printer-resident font is used. If an exact match printer-resident font does not exist and FIDELITY(*ABSOLUTE) is specified, the print job will not print and is placed in hold status. However, if the fidelity is *CONTENT, a font that matches the requested font as much as possible will be substituted. If the printer does support downloaded fonts, and the font cannot be found (by searching font libraries in the library list) or is in the wrong resolution, an attempt is made to substitute a printer-resident font. If there is not an exact match, the print job will be placed in hold status. Whenever the specified font is not used, and another font is substituted, an informational message is logged.

You can find complete font tables and substitution lists in the publication *IBM AS/400 Printer Device Programming* (SC41-5713).

Prior to OS/400 V4R2, a message was displayed each time a font was successfully or unsuccessfully substituted. Now it is possible to suppress messages regarding *successful* font substitutions. To suppress messages regarding successful font substitution, select *NO for the parameter FNTSUBMSG in the CHG/CRTPSFCFG command. Messages indicating that a font substitution attempt failed will still be issued, regardless of the value in FNTSUBMSG. If you want all font substitution messages to be issued, select FNTSUBMSG *YES.

Finding Fonts

When a font is referenced without a library qualifier, the following sets of libraries are searched to locate the font:

- The job (interactive or batch) library list
- System font libraries, as listed below:
 - QFNTCPL

This library is shipped with the operating system. It contains the 240-pel AFP Compatibility Fonts.

It is generally a better idea to use *LIBL for a font library than specify one individually, because when you specify an individual library, you limit your fonts to a single resolution.

If your application prints on a 300-pel printer and also sends faxes, both 300-pel and 240-pel fonts are required because FAX is supported at 240-pel only. If you then specify a library qualifier, this eliminates one version (either the 240-pel or 300-pel) of the requested fonts.

V3R2 provides enhanced font library support with the Device Resource Library list.

Specifying the User Resource Library List

The User Resource Library list allows you to specify libraries to be used when searching for font and AFP resources. The User Resource Library list is searched first and then the Device Resource Library list is searched when attempting to find an AFP resource specified within the spooled file.

In Version 4 Release 4, the *PRTF value has been removed as a valid value for the USSRSLIBL parameter. PSF configuration objects migrated from other releases that were created with USSRSLIBL(*PRTF) are supported the same as in previous releases as long as the new USSRSLIBL parameter on the printer file has the value of *DEVD. When a CHGPSFCFG command is executed with USSRSLIBL(*DEVD), a value of *SAME is displayed where the value of *PRTF would have been displayed in a previous release.

Values supported on the User Resource Library list are:

- | | |
|------------------|---|
| *JOB LIBL | Specifies that the job's current library list that created the spooled file is used in searching for AFP resources. The job's library list at the time the spooled file is created is saved. Each time you create a new spooled file, the job library list is saved. This is the default. |
| *CURLIB | Is the current library for the job that created the spooled file and is used in searching for AFP resources. If no library is specified as the current library for the job, then library QGPL is used. |
| *NONE | Specifies that no user resource library list will be used in searching for AFP resources. Only the device resource library list will be used. |

Specifying the Device Resource Library List

The Device Resource Library list allows you to specify a device resource library list to be used in searching for AFP resources. The User Resource Library list is searched first and then the Device Resource Library list is searched when attempting to find an AFP resource specified within the spooled file.

Values supported on the Device Resource Library list are:

- | | |
|-------------|--|
| *DFT | Specifies that the following libraries (if present on the system) will be used in searching for AFP resources. <ul style="list-style-type: none">• QFNTCPL• QFNT01 - QFNT19• QFNT61 - QFNT69 |
|-------------|--|

Device Resource Library Names

This is a list of up to 30 library names that will be used in searching for AFP resources.

There is a two-fold value in using the User Resource Library and Device Resource Library lists. They enhance usability because you now can specify one set of libraries for a 240-pel printer and another set of libraries for a 300-pel printer. You also can ensure that the libraries that contain the resources needed by the specified job or printer are in the library list that PSF will use. Using the library lists also can improve performance because you can fill in just the libraries that need to be searched and leave out any that do not need to be searched.

Refer to the *AS/400 CL Reference* and *AS/400 Printer Device Programming* for more information about PSF configuration objects.

Using Fonts with AS/400 Applications

Let's summarize what we have learned about AS/400 fonts:

- **Raster and outlines:** 240 dpi and 300 dpi raster format, and resolution-independent outlines
- **Monospaced and typographic:** Monospaced fonts have equal character spacing, typographic fonts vary the character spacing. Typographic fonts are more readable and effective. Monospaced fonts are required for columns of data that must line up on both the left and right margins.
- **Printer-resident and AS/400-resident:** Fonts can permanently reside in the printer, be in font libraries on the AS/400, or be downloaded as required.
- **Font products:** OS/400 comes with several standard fonts such as Courier, Gothic, and Prestige (in 240 dpi only). AFP Font Collection provides a comprehensive set of AFP fonts as well as optional OS/2 font programs to create your own fonts.
- **Font structure:** Character sets contain character bitmap or outline shape data. Code pages relate hexadecimal code points to character data in the character sets. Coded fonts identify a code page - character set pair.
- **Font libraries and library lists:** Fonts can be stored in any AS/400 library. In practice, the fonts are normally stored in QFNTxxxx libraries. Standard library lists can be used to locate fonts. In addition, there are device or printer-specific library lists.
- **Font selection and substitution:** If an AS/400-resident font is not found, a printer-resident font will be substituted, and vice versa.

How are fonts used with various AS/400 printing applications? For printer files, the font used applies to the entire print file. Fonts can be selected by font global ID (FGID), character set, or coded font. For DDS output formatting, fonts can be specified at the job, record, or field level. Again, fonts can be selected by FGID, character set, or coded font. Advanced Print Utility has a font database for font selection. You are prompted for a font much like PC applications - font family, font style, and point size. Based on your selection, APU will select the right character set and code page. Overlay Utility and Print Format Utility both set up a font table to assist in selecting fonts. Entries in this font table can be FGID, character set, or coded font. AFP Toolbox and page definitions define character sets or coded fonts to be used in the print formatting logic. OfficeVision supports fonts only by FGID (although AS/400-resident fonts can be forced by selecting an FGID that does not

exist and font substitution takes over to select the desired AS/400 font). Facsimile Support uses only 240 dpi fonts, as the facsimile process emulates an IBM 3812 printer (a 240 dpi printer).

Chapter 7. Image and Graphics

Image and graphics are key components in creating advanced electronic print and presentation applications. In some cases, such as with accent images, the purpose of the image or graphic is to improve the look and effectiveness of output. In basic documents, images, such as an enterprise logo, are an essential part of the document. In other image applications, such as an integrated check image on bank statements, the image itself is part of the application.

Some common examples of putting image and graphics to work in AS/400 applications include:

- Document logos
- Electronic signatures
- Accent images, such as the variable image used in the Super Sun Seeds sample application (see “Chapter 11. Using Data Description Specifications” on page 127)
- Document image, such as check image and freight bill image
- Pictorial graphics, such as pie and bar charts

Figure 20 shows a Super Sun Seeds invoice case study with an example of an image (the Super Sun Seeds logo) and a graphic (the pie chart). In fact, there are more graphics on the invoice than just the pie chart. The line and box elements on the invoice form are also graphics.




 Super Sun Seeds A Growth Company		Office: 555-499-2367 Fax: 555-415-9794			
400 CPU Parkway Vegetation, NJ 55090					
11111111111111111111111111111111 LOS ARBOLES DEL MUNDO 32483 ARBOL LANE MESA VERDE IL 65478-9390		SAME			
-- Sold To --		-- Ship To --			
Customer Number: 141	Invoice Number: 31341	Invoice Date: 7/28/95 Payment Date: 8/28/95			
Ship Via: Ship date: 7/28/95 Terms: N10 Salesman: MICHELE GOODACR					
Qty	UOM	Item #	Item Description	Price	Extension
1000	EX	56413213	POT POT	7.65	7,650.00
45	EZ	11005015	CHANTENAY SEEDS	2.19	98.55
900	EA	00001200	ARBOLAS DEL SUR	45.00	40,500.00
98	PK	84512023	OREGON SPRING TOMATO SEED	.97	95.06
4	EX	11057893	AFRICAN DAISY, SEEDS	2.35	9.40
951	CT	11005011	LIASSO RED SEEDS	892.23	48,510.73
46	DZ	11005014	SCARLET NANTES SEEDS	5.90	271.40
100	EA	31321655	SEMILLAS DEL SUS SOMBEROS	24.95	2,495.00
				 Thank You <i>Because almost half of your order was Lasso Red Seeds, you will receive a 10% discount on your next order.</i>	
Total Due					\$99,630.14
Return this tear-off strip with your payment. Payment is due by: 8/28/95			Make Checks Payable to: Super Sun Seeds Amount Due is: \$99,630.14		
LOS ARBOLES DEL MUNDO 32483 ARBOL LANE MESA VERDE IL 65478-9390					
 0001410099630146					

Figure 20. Image and Graphic on the Sample Page

Image and Graphics in AFP Output

AFP output can contain both graphics and images. Images are captured. Graphics are created. In many instances, these terms are used interchangeably, but for data processing applications, they are used very differently.

The term *image* is usually applied to a captured replica of an external source document. The source document can be a photograph, drawing, signature, or a printed or handwritten page. The source document is usually captured by a scanner.

The term *graphic* is normally applied to pictorial data that is created internally. AS/400 applications that create graphical data include:

- Business Graphic Utility/400
- GDDM/400
- Advanced Function Printing Utilities for AS/400

Graphics applications enable you to create shapes with lines or generate charts based on numerical input. The resulting graphic can be as simple as a box on an electronic form, or as complex as an engineering drawing.

Image and graphics are also distinguished by how the object is stored. Images are stored in digital format. Regardless of image file format, the image is represented by a string of bits that correspond to the exact layout of the dots on the page required to reproduce the image.

If the image is stored as a complete string of bits, it is called a raster, or bitmapped, image. There are data-reduction techniques that can compress the amount of storage required to record the image. This is called a compressed image.

An image is closely tied to the resolution at which it was created. An image that is scanned at one resolution and printed at another will change in size, and possibly proportion, unless some compensating manipulation is done.

Graphics are stored in vector representation and are similar to mathematical equations. A graphic is made up of commands to draw lines, arcs, and circles. The size of the final output can be varied by modifying the vector equations. Thus, graphics can easily be scaled or sized. They also take up relatively little storage space. In Advanced Function Presentation, graphic elements are in the lines and boxes that comprise electronic forms, in the drawing orders for scalable or outline fonts, and in the bar and pie charts created with Business Graphic Utility/400 and GDDM/400.

Image and Graphics Terms

The following are common terms used in working with image and graphics:

- | | |
|--------------------|--|
| Bilevel | Image composed of only black and white pels. A bilevel pel is represented by a single bit. Most printers are bilevel image printers. |
| Clip | To truncate image information that lies outside a given boundary. |
| Compression | Method of making image data files smaller so that less disk space |

is used to store them and less system and printer resources are used to send and print them. Common compression methods are CCIT/3 and CCIT/4.

Crop	In multimedia applications, to cut off or trim.
File Format	How image data is physically stored in a file. For example, how the image header is structured, and how the actual image data is stored. Each image file format has a unique structure that enables programs that work with image to identify which format is being used.
Page Segment	General term for an AFP image object. A page segment object is an IOCA image file with the AS/400 object wrappers.
Pel	Abbreviation for picture element. Smallest addressable element of an image.
Pixel	Early nickname for picture element. Pel is now the more common term.
Raster	In computer graphics, a predetermined pattern of lines that provides uniform coverage of a display space.
Resolution	Number of pels per unit length on the image device, whether that device is a scanner, display, or printer. Common image resolutions are 144 pel (also called dots per inch, or dpi) for impact printers, and 300 pel and 600 pel for printers and scanners.
Scale	In computer graphics, to enlarge all or part of a display image.
Scanner	Device to convert a photo for printer image into digital form.
Wrappers	Header and trailer information “wrapped” around an image object enabling it to conform to a particular document architecture.

Image File Formats

The following are the most widely used file formats for storing bilevel image data:

BMP	Simple format, generally used for display, clip art, and so on. BMP is seldom compressed. Signature is X'4D42' in the first two bytes.
CGM	Computer Graphics Metafile. Industry standard specification for graphics creation.
EPS	Encapsulated Postscript. Subset of the Postscript page description language from Adobe. EPS supports both raster and graphic formats.
IM1	IPDS format for uncompressed raster image.
IMDS	Image Data Stream. Architected image format, more widely known as IOCA.
IOCA	Image Object Content Architecture. Can be compressed or uncompressed. Also known as IO1.
PCX	Simple format, generally used for display, clip art, and freehand graphics. Signature is X'0A' in the first byte.
TIFF	Tag Image File Format. Most common file format in document imaging and scanning. Signature is “II” or “MM” in the first two bytes. Compatible with a number of personal computing platforms.

Image Compression

Scanners are capable of handling densities from 100 pels to 1200 pels and beyond. Storing an 8-1/2 by 11 inch page at 300 pel density requires over 1 million bytes for simple bilevel images. Gray scale and color images take up significantly more storage space. In addition, uncompressed images have to be laboriously moved around the system to be displayed or printed.

Image compression techniques identify line by line patterns and can significantly reduce the storage size of an image. A compressed image can be more efficiently sent to imaging devices, such as printers. IPDS printers are designed to efficiently decompress compressed images.

IPDS printers support four different image compression techniques:

- CCIT Group 3, the industry standard for facsimile (FAX) machines
- CCIT Group 4, the industry standard for scanners
- MMR, used by IBM scanners
- ABIC, a compression technique used to handle checks and financial documents

Compression techniques tend to work most effectively with images that have a lot of black and white space. They are less effective with photographs. Referring again to an example of an 8-1/2 by 11 inch scanned image, this size image could easily be compressed to 1/10 its size (100,000 bytes, or less) if it was a high contrast image, that is, one with lots of black and white space.

Image is generally stored on AS/400 in two formats, IOCA and IM1. All IBM printers support IM1, and nearly all current IPDS printers support IOCA image, which has become the standard. Image for AFP printing applications is stored as page segment objects. Image for OfficeVision/400 is IOCA and is stored in folders. Image for ImagePlus/400 and Workfolder Application Facility/400 is also IOCA and stored in folders.

Besides image compression, IOCA images:

- Can be placed in any position on the page
- Are resolution independent
- Can be scaled, enlarged or reduced, by the printer to any size
- Can be rotated by the printer
- Can be clipped by the printer so that only a portion of the image is printed

Building Images

Creating an image for AS/400 printing applications involves several steps, from scanning the source document to creating the page segment object. The steps are:

1. Scan the source image
2. Touch up the scanned image
3. Convert the image file to IOCA format
4. Upload the IOCA file to the AS/400
5. Compile the page segment object

Note: There are also services available from IBM to build image objects for your AS/400 applications.

Scanning Images

The scanning process converts the source document into digital format. Some scanning software writes the digitized image to a file, in an image format such as TIFF. Other software can pass the digitized image directly to an editing program.

The quality of the source document is essential in getting a good scanned image. For example, for the Super Sun Seeds logo, we would seek out what is called “camera-ready artwork”, that is, high-contrast, black and white reproductions that scan cleanly. For signatures, we again want high contrast. Signatures with medium black felt tip pens on white paper should scan well.

Note: Scanning should be done in the same resolution that the image will be printed in.

Touching Up Images

Images that become repetitive elements of electronic documents normally need some touch-up to become clear and sharp. Touching up removes the imperfections in the scanning process.

There are many software choices for image editing. Many Windows and OS/2 programs process image file formats and support image editing. A number of programs, such as ElixirImage and ISIS Image, are part of dedicated systems used to build AFP image and forms. Whatever the tool, the process is one of turning on or off black and white pels to create a sharp, clear image.

Figure 21 on page 78 shows the Super Sun Seeds logo image as scanned into ImageEdit, an image management program from ISIS. Most image systems like ImageEdit have a series of image touch-up tools with varying levels of granularity that enable work down to the individual pel level.

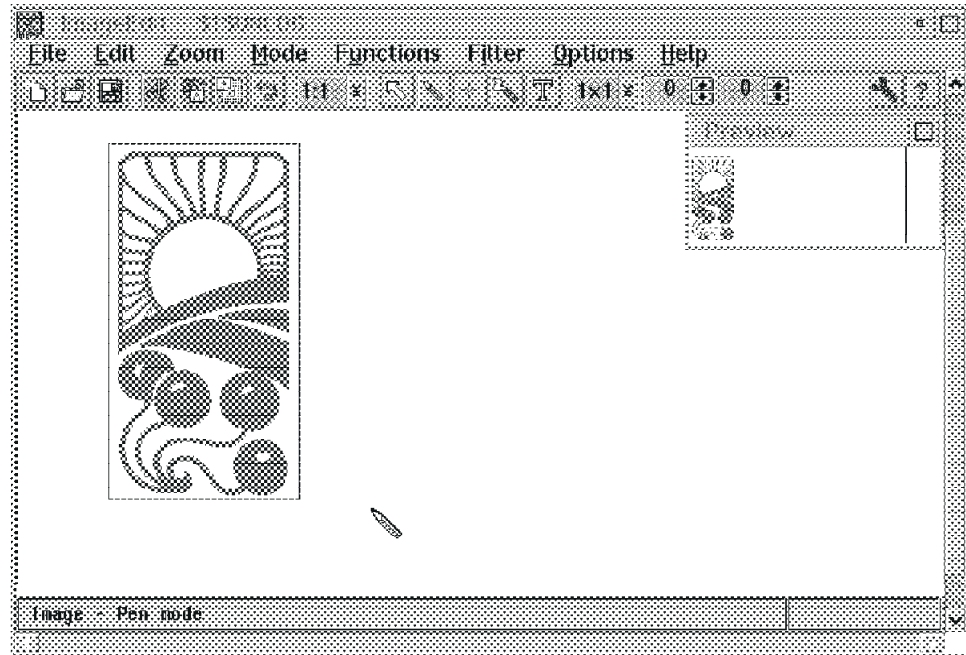


Figure 21. Super Sun Seeds Logo Image Scanned into ImageEdit

Because the Super Sun Seeds logo will be used in 300-pel resolution, each square inch will have 90,000 individual dots or pels. Therefore, it is necessary to zoom in on this image to work with it effectively.

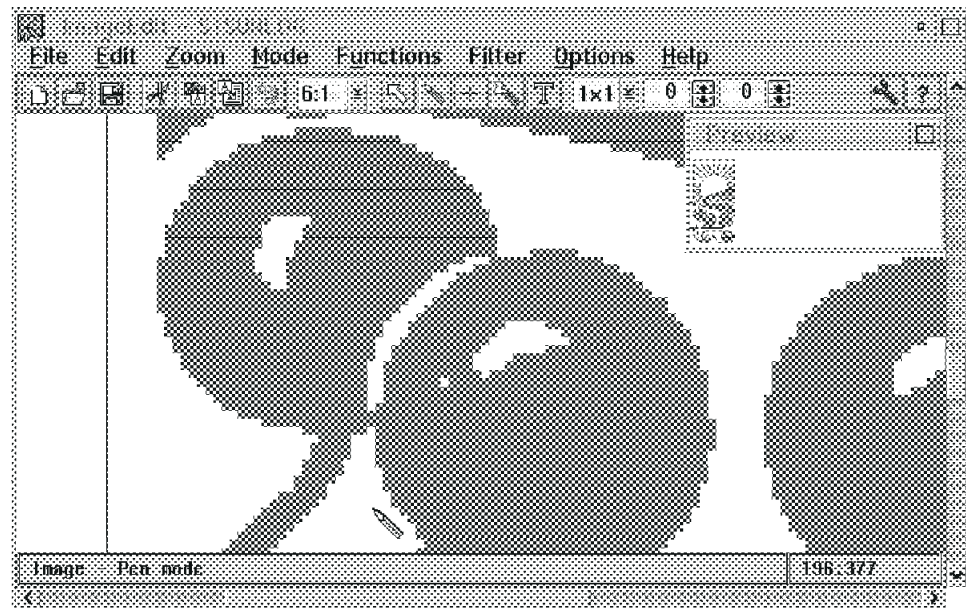


Figure 22. Zooming in on the Super Sun Seeds Logo Image

Figure 22 above shows how several of the individual cherries in the image appear when they are magnified at an 8:1 ratio. Notice that at this level the circular cherries look far less circular. Any patterns that are not exactly horizontal or vertical will exhibit a “stairstepping” effect at this level of detail. The object is to smooth out these patterns as much as possible, and to remove extraneous pels.

There are several exceptions to the above “full touch-up” process:

- Signatures, as legal images, should only have extraneous black and white pels cleaned up
- Images that have not been scanned, such as images pulled from clip art, do not require touch-up
- Watermarks, gray scale images meant to blend into the background of an electronic document, do not require touch-up
- Documents such as check image are taken as is

Image Size:

In some cases, the image is required in several different sizes. For example, a company logo may be used in different sizes in several different documents. You have several options:

- Work with camera-ready artwork in each size and go through the imaging process (scan, touch-up, upload, object creation) for each size. You would end up with separate page segment objects to be referenced in each document application.
- Scan and touch up one size, then use the imaging software to create additional sizes. Touching up the largest size you will need is the best approach. Most images will be degraded as they are enlarged. Resource Management Utility, a module of AFP Utilities, resizes image objects on AS/400. Most PC imaging products also provide for resizing image objects. Again, you would end up with multiple page segments.

Image Orientation:

Another image consideration is orientation, or the direction of the image relative to the general direction of the page. The four orientations are zero, 90, 180, and 270 degrees. These orientations are also referred to as *across*, *down*, *back*, and *up*. For most printers, a page in landscape format is oriented 90 degrees to the standard direction of the paper. In this case, an image would have to also be oriented 90 degrees in order to appear correctly.

As with image size, there is a similar option in producing the image. Resource Management Utility creates page segments in any or all of the four orientations. Most PC imaging products also have this capability. This would result in up to four page segment objects for a given image.

Converting Images to IOCA

At this point, the image is either sitting in the image editor, or is in image file format. The IBM AFP Printer Driver for Windows enables you to “print” the image to a file in IOCA format. The file can be written directly to a folder on your AS/400. The driver also provides the ability to compress and clip the image.

AFP forms systems, such as ISIS Image and ElixirImage, also provide functions to convert to AFP image format, that is, IOCA.

In addition, there are image programs, such as Hijaak Pro and Graphic Converter for Windows, that work with a wide variety of image formats and provide for conversion to IOCA format.

If you build the page segment using the Advanced Function Printing Utilities for AS/400 Resource Management Utility, the input must be IOCA.

Creating an IOCA Page Segment with the IBM AFP Printer Driver for Windows

The process of using the IBM AFP Printer Driver for Windows to create an image (IOCA format) file and then converting it to an IOCA page segment is described below.

First, use the standard procedures to install the IBM AFP Printer Driver for Windows. Now you are ready to set up the driver and use it to print your image file. The following example uses the Windows Paintbrush program. The process would be similar for any Windows image application.

Setup of the IBM AFP Printer Driver for Windows

1. Select FILE on the Paintbrush menu bar.
2. Select PRINT SETUP.
3. Scroll down the list of printers and highlight AFP 300 on FILE or the AFP device installed.
4. Select OPTIONS.
5. For output type, highlight PAGE SEGMENT
6. Select OK on the Options dialog box.
7. Select OK on the Printer Setup dialog box.

You are now ready to print your image, but instead of printing it, you will write the image to a file in AFP page segment format.

Writing the Page Segment File

1. Select FILE on the Paintbrush menu bar.
2. Select PRINT.
3. Select Partial (this enables you to create a page segment that is cropped to the size of the actual image, rather than a full page).
4. Select OK.
5. A view of the Paintbrush window with your image is shown. Use the mouse to draw a box around your image, exactly how you want it cropped.
6. When prompted for the file name, specify a file name for a specific shared folder. For example, specifying `i:\qdl\resource\sunlogo.psg` writes a file called *sunlogo.psg* in the folder *resource* on the *i* drive. An alternative method is to FTP the file.
7. Select OK.

Instead of cropping your image by drawing a box around it during the driver print, you can do one of the following:

- Before designing your image, go to PRINTER SETUP and define a page size that matches the dimensions of your image.
- Use the Clip Limits under Advanced Options within the IBM AFP Printer Driver for Windows. For the clip method, select offset plus size. Set the margins to match the size of your image.

Uploading and Compiling the Image

Once the image file is created and resides in an AS/400 folder, it must be first transferred to a temporary physical file and then created as an AS/400 page segment object. There are three methods to use:

- Enter the individual commands
- Create and use the SEGMENT command. See “Appendix I. AS/400 SEGMENT and OVERLAY Commands” on page 343 for more information on the SEGMENT command.
- Use Resource Management Utility (Advanced Function Printing Utilities for AS/400)

The first method involves the use of individual commands as follows:

1. Create a resource database

Go to an AS/400 command line and use the following command to create a file to receive the PC resource:

```
CRTPF FILE(MYLIB/PAGESEG) RCDLEN(8201) LVLCHK(*NO)
```

The suggested record length is 8201 (32766 is the maximum) and the level check parameter must be *NO.

2. Transfer the PC resource to the AS/400 database

Use the CPYFRMPCD command to transfer the PC resource to the AS/400 database. Figure 23 shows the display that appears when you use the CPYFRMPCD command.

Copy From PC Document (CPYFRMPCD)

Type choices, press Enter.

From folder > resource_____

To file	> pageseg__	Name
Library	mylib__	Name, *LIBL, *CURLIB
From document	> sunlogo.img	Name
To member	*FIRST__	Name, *FIRST, *FROMDOC
Replace or add records	*REPLACE	*REPLACE, *ADD
Translate table	> *NONE__	Name, *DFT, *NONE
Library	_____	Name, *LIBL, *CURLIB
Format of PC data	> *NOTEXT__	*TEXT, *NOTEXT

Bottom

F3=Exit F4=Prompt F5=Refresh F12=Cancel F13=How to use this display
F24=More keys

Figure 23. Copy From PC Document (CPYFRMPCD) Display

From folder

Enter the name of the AS/400 system where you copied the PC image file

To file Enter the name of the resource file you created

From document

Enter the name of the document from which you will make the copy

Translate table

Specify *NONE; the resource should not be translated

Format of PC data

Specify *NOTEXT; the resource is not text

3. Create the Page Segment

Use the CRTPAGSEG command to create an AS/400 page segment (object type *PAGSEG). Figure 24 shows the display that appears when you use the CRTPAGSEG command.

Create Page Segment (CRTPAGSEG)

Type choices, press Enter.

Page segment	>	SUNLOGO	Name	
Library	>	MYLIB	Name, *CURLIB	
File	>	PAGESEG	Name	
Library	>	MYLIB	Name, *LIBL, *CURLIB	
Member	>	*PAGSEG	Name, *PAGSEG	
Text 'description'	>	Super Sun Seeds Logo		

Bottom

F3=Exit F4=Prompt F5=Refresh F10=Additional parameters F12=Cancel
 F13=How to use this display F24=More keys

Figure 24. Create Page Segment (CRTPAGSEG) Display

You have now created an AS/400 page segment. You can use it in any overlay or directly in your DDS printer file.

You can automate the above process by using the SEGMENT command. The SEGMENT command prompt is shown below.

```

                                Create/Print Page Segment (SEGMENT)
Type choices, press Enter.
Folder . . . . . resource
Document Name . . . . . sunlogo.psg Character value
Segment Description . . . . . Super Sun Seeds Logo
Page Segment Name . . . . . sunlogo Character value
Library . . . . . sampler Character value
Display Segment . . . . . *YES *NO, *YES
Output Queue . . . . . '*JOB ' Character value
Output Queue Library . . . . . '*LIBL' Character value
Replace Old Segment . . . . . *YES *NO, *YES
Bottom
F3=Exit F4=Prompt F5=Refresh F12=Cancel F13=How to use this display
F24=More keys

```

Figure 25. Create/Print Page Segment (SEGMENT) Display

The SEGMENT command also prints a proof of your new page segment. Optionally, you can request the Client Access/400 Viewer to be launched from the command (assuming you are running the command from a client workstation) and view the page segment.

Resource Management Utility, which provides a complete system for managing overlays and page segments, can create your page segment object. Select Option 21 from the main AFPU (GO AFPU) menu as shown below.

```

AFPU          IBM Advanced Function Printing Utilities for AS/400
Select one of the following:

Overlay Utility
  1. Work with source overlays
  2. Work with source overlay files

Print Format Utility
  11. Work with PFD definitions
  12. Work with PFD definition files
  13. Print database file member
  14. Print AFP Utilities tutorial

Resource Management Utility
  21. Convert to page segment
  22. Work with overlays
  23. Work with page segments

Selection or command
==> 21
F3=Exit F4=Prompt F9=Retrieve F12=Cancel F16=System main menu

```

Figure 26. AFPU Main Display

When you select Option 21, the following display appears:

Convert to Page Segment

Type choices, press Enter.

Page segment	SUNLOGO	Name
Library	*CURLIB	Name, *CURLIB
Source object type	1	1=PC document, 2=File
From folder	RESOURCE	
From PC document	sunlogo.psg	Name
Change image size	N	Y=Yes, N=No
Degree of rotation	0	0, 90, 180, 270
Authority	*LIBCRTAUT	Name, *LIBCRTAUT, *CHANGE
		*ALL, *USE, *EXCLUDE
Text 'description'	'Super Sun Seeds	Logo @ 0'
Replace	Y	Y=Yes, N=No

Bottom

F3=Exit F5=Refresh F12=Cancel

Figure 27. Convert to Page Segment Display

The Convert to Page Segment command (CVTPCDPAGS) creates an AS/400 page segment object directly from the image file residing in the AS/400 folder. As shown on the display, you can also resize the image or create the four orientations. Resource Management Utility also prompts you for printing a proof of the newly created page segment.

Using Images on AS/400

The image in AS/400 page segment objects can be built into your application output in a number of ways, including:

- Invoking it in the DDS printer file
- Placing it within an Advanced Function Printing Utilities for AS/400 (AFP Utilities) overlay
- Referencing it within any AS/400 overlay object
- Placing it in a print application with the Print Format Utility of AFP Utilities
- Specifying it using Advanced Print Utility (APU)
- Specifying it within a page and form definition object
- Using it directly in AFP data streams, such as those created by the AFP Toolbox
- Imbedding it in an OfficeVision/400 document

The following chapters on applications provide examples of how your image page segments can be used.

Using Graphics

Graphical Data Display Manager (GDDM) and Business Graphics Utility (BGU) provide the capability to add graphical data (such as bar and pie charts) to your electronic document. GDDM is a set of routines that are called from a high-level program to create graphical orders and a graphics file. BGU is a stand-alone utility that creates graphic data from database file information. Both of these applications create files that can be placed in your output (using the GDF keyword in DDS, for example).

Chapter 8. Bar Codes

Bar codes represent characters with sets of parallel bars of varying width and separation or varying heights. Combinations of bars and spaces form individual characters, which in turn represent a numeric or alphanumeric symbol that may be a product, part, or publication number. Bar codes are designed to be read by a device called a bar code reader or scanner. The scanner must be compatible with the printed bar code symbology.

Bar codes can be produced using either AFP data stream presentation text data or an AFP data stream bar code data object. A bar code data object, which is a set of structured fields, specifies the type of bar code (the symbology), its size, and positioning information. Many different bar code symbologies can be produced using bar code objects.

Bar Code Terminology

The following list of terms explains some of the basic language used in bar code applications.

Aspect Ratio

The ratio of the length (or height) of a bar to the length (or width) of the bar code symbol.

Bearer Bars

A bar across the top and bottom edge of the bar code. Partial scans of bar code symbologies, such as Interleaved 2 of 5, can produce valid, but incorrect, reads by self-discriminating scanners. Bearer bars help prevent such errors and increase reliability.

Note: A self-discriminating scanner is one that automatically determines which bar code symbology it is reading.

Check Character

The result of some mathematical combination of the characters in the field being bar coded. Used as a check of the accuracy of both the input of the data field and the scanning of the bar code. A bar code can have 0, 1, 2 or sometimes more check characters.

Check Digit

Same as a check character, but limited to decimal digits only.

Continuous Code

A bar code in which each character starts immediately after the preceding character. There is no space or gap between characters. Interleaved 2 of 5 is an example of a continuous bar code.

Density

A measure of the number of characters per inch or per millimeter represented by the bar code. A high-density bar code represents more characters per inch than a low-density bar code.

The bar code symbology helps determine the density. Within a given symbology, factors that affect the density of a bar code are: the x-dimension (width of the narrow bar) and the wide-to-narrow ratio (width of a wide bar relative to the narrow bar).

Discrete Code

A bar code constructed with groups of bars and spaces representing individual characters and having a space or intercharacter gap between each group. This gap is used solely to separate characters and contains no data. Code 3 of 9 is a discrete bar code.

First Read Rate

The percentage of the bar code scans that read correctly on the first scan of the bar code. A 99% or higher first read is desirable. Anything below 85% is normally not acceptable.

Human Readable Interpretation (HRI)

The translated characters of a bar code that are able to be read by a human.

Intercharacter Gap

The space between characters in a discrete bar code symbology.

Ladder Orientation

Bar code orientation where the bars are parallel to the base of the document (like the rungs of a ladder). Sometimes called vertical orientation (because that is the direction of the scan).

Picket Fence Orientation

Bar code orientation where the bars are perpendicular to the base of the document (like the pickets in a picket fence). Sometimes called horizontal orientation (because that is the direction of the scan).

Quiet Zone

A blank area prior to and following a bar code. This required space enables the scanner to differentiate the start and stop of a bar code. The size of the quiet zone is usually 10 times the x-dimension or 1/4 inch, whichever is larger.

Symbology

The name of the specification used to define the combinations of bars and spaces for encoding data.

Wide-to-Narrow Ratio

The ratio of the width of the wide bar or space to the narrow bar (x-dimension) or space in a two-width symbology. This ratio is usually in the range of 2:1 to 3:1.

X-Dimension

The width (usually in thousandths of an inch) of the narrow bar or space of the bar code symbology.

Bar Code Basics

All bar codes, regardless of the symbology used, are created using the same, basic elements.

Figure 28 on page 87 shows the common elements of all bar codes.

Bar Code Basics

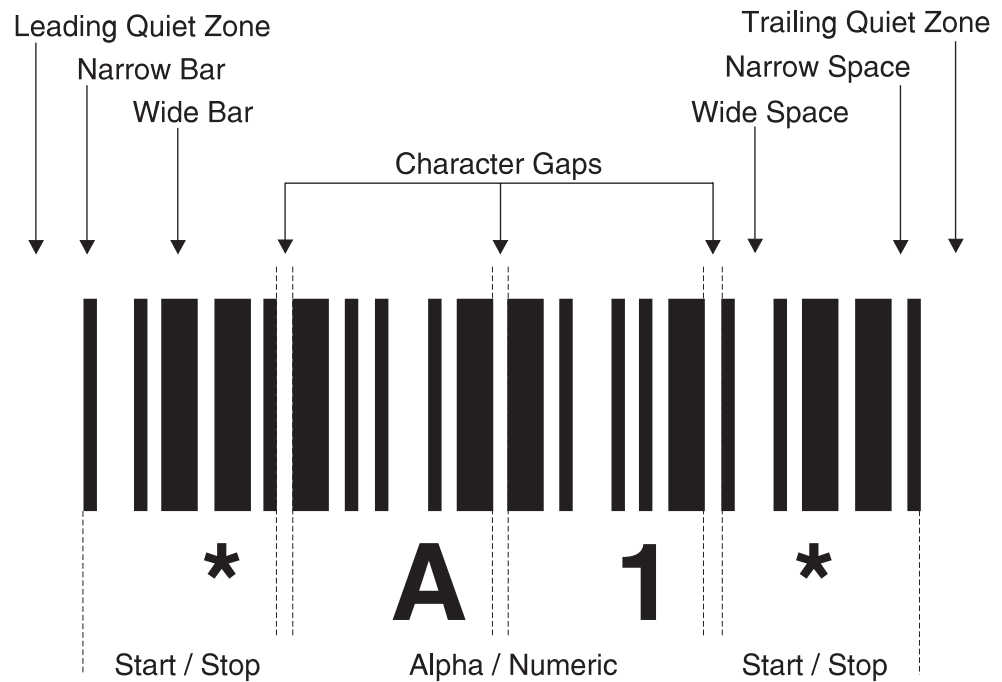


Figure 28. Basic Bar Code Elements

Bar Code Symbolologies

Many different types of bar code symbolologies, or coding arrangements, have been developed. Among the more widely used bar code symbolologies are:

- Code 3 of 9
- Codabar
- Interleaved 2 of 5
- Code 128
- Universal Product Code (UPC)
- European Article Numbering (EAN)
- Postnet (Postal Bar Code)
- Royal Mail (Postal Bar Code)
- Japan Postal (Postal Bar Code)
- Australian Postal (Postal Bar Code)

Code 3 of 9 Bar Code Example

Code 3 of 9 is a discrete bar code symbology because each character stands by itself and is separated from the others by a non-data space or intercharacter gap. Code 3 of 9 is constructed so that each character has 9 elements (count both bars and spaces but do not count the intercharacter gap) with 3 of those elements being wide.

Figure 29 shows an example of the Code 3 of 9 bar code symbology.

Code 3 of 9



Figure 29. Code 3 of 9 Bar Code Example

Codabar Bar Code Example

The Codabar bar code represents digits 0 through 9 plus six characters. There are four start/stop codes, which can be used in any sequence and for additional data storage. Codabar is insensitive to ink spread and it has 18 different bar and space widths. Codabar is not normally used for new applications because of its low density and limited character set.

Figure 30 shows an example of the Codabar bar code symbology.

CODE - A - BAR



Figure 30. Codabar Bar Code Example

Interleaved 2 of 5 Bar Code Example

Interleaved 2 of 5 is a continuous bar code symbology. There are no gaps or non-data spaces between the characters. When one character ends, the next character begins. 2 of 5 symbologies are numeric only and use 5 elements to represent a single digit. Two of the 5 elements are wide.

Interleaved 2 of 5 represents one digit with all bars and the next digit with all spaces. The spaces of a digit represented with all spaces are interleaved between the bars of the digit represented with all bars.

Because of the interleaved construction, Interleaved 2 of 5 values are always an even number of digits. The many bar and space combinations of Interleaved 2 of 5 make it possible to read only a portion of the bar code and have that portion interpreted by a self-discriminating scanning system as a valid field in another symbology. This error potential is minimized in two ways:

- Most scanner interfaces offer the option to select the exact number of digits to be scanned. If the number of digits scanned is not equal to the selected number, a misread occurs.
- Bearer bars along the top and bottom of the bar code will stop the scan if the scanning spot strays outside the bar code symbol. A misread occurs.

Note: Bar codes with bearer bars are not supported by DDS and must be printed with fonts.

Figure 31 shows an example of the Interleaved 2 of 5 bar code symbology.

Interleaved 2 of 5



Figure 31. Interleaved 2 of 5 Bar Code Example

Code 128 Bar Code Example

Code 128 is a continuous bar code symbology. It can represent all 128 characters of the ASCII character set and has the capability to represent individual characters or interleaved digits or both all in the same bar symbol. Each character is composed of 11 modules grouped into 3 bars and 3 spaces. Bars are 1, 2, 3 or 4 modules wide. There is no wide-to-narrow ratio for Code 128.

Figure 32 shows an example of the Code 128 bar code symbology.

Code 128



Figure 32. Code 128 Bar Code Example

Universal Product Code (UPC) Bar Code Example

Universal Product Code (UPC) is a continuous bar code symbology that also uses the module approach to construct digits. UPC uses 2 bars and 2 spaces and there is no wide-to-narrow ratio.

This type of bar code is divided into two halves, a left side and a right side. Digits on the left side are coded in odd parity (bar widths total up to an odd number of modules) while digits on the right side are coded in even parity. This enables either side of the symbol to be decoded separately and provides the advantage of being able to scan the bar code from almost any angle.

Figure 33 shows an example of the Universal Product Code (UPC) bar code symbology.

UPC - A



Figure 33. Universal Product Code (UPC) Bar Code Example

European Article Numbering (EAN) Bar Code Example

European Article Numbering (EAN) is a continuous bar code symbology that also uses the module approach to construct digits. Unlike Code 128, however, EAN uses only 2 bars and 2 spaces and there is no wide-to-narrow ratio.

This type of bar code is divided into two halves, a left side and a right side. Digits on the left side are coded in odd parity (bar widths total up to an odd number of modules) while digits on the right side are coded in even parity. This enables either side of the symbol to be decoded separately and provides the advantage of being able to scan the bar code from almost any angle.

Figure 34 shows an example of the European Article Numbering (EAN) bar code symbology.

EAN-13



Figure 34. European Article Numbering (EAN) Bar Code Example

Postnet (Postal Bar Code) Bar Code Example

The Postnet bar code uses five bars to represent a digit. The data is based on the height of the bars instead of on their width. This symbology requires a check or correction digit. Postnet is a numeric bar code only with each digit having 2 tall and 3 short bars.

Figure 35 shows an example of the Postnet bar code symbology.

POSTNET ZIP



Figure 35. Postnet Bar Code Example

Royal Mail Bar Code

The Royal Mail bar code uses numeric and alphabetic characters to represent the International Prefix, the Outward Code, the Inward Code, and the Delivery Point Suffix. Only the Outward Code and Inward Codes are required. Royal Mail bar code support is new with AFPU, Version 4 Revision 2.

Figure 36 shows an example of the Royal Mail bar code symbology.

Royal Mail



Figure 36. Royal Mail Bar Code Example

Japan Postal Bar Code

The Japan Postal Bar code input data length is 7 – 50. The length of the output bar code is always the same. Data is padded or truncated to achieve the correct length. Input characters are English alphabetic characters A-Z, numeric characters 0–9, and the hyphen. Japan Postal bar code support is new with AFPU, Version 4 Revision 2.

Figure 36 on page 90 shows an example of the Japan Postal bar code symbology.

Japan Postal



Figure 37. Japan Postal Bar Code Example

Australian Postal Bar Code

The following four formats of the Australian Postal bar code are supported in Advanced Function Print Utilities, Version 4 Release 4:

- Standard Customer Bar Code, length 37 bars, no bars of customer information.
- Reply Paid Bar Code, length 37 bars, no bars of customer information.
- Customer Bar Code 2, length 52 bars, 16 bars of customer information.
- Customer Bar Codes 3, length 67 bars, 31 bars of customer information.

Input data length is 10 to 25. The length of the bar code depends on the format, but the length is the same for all that are the same format. Input characters are English uppercase alphabetic characters A - Z, English lowercase alphabetic characters a - z, numeric characters 0 - 9, the space, and number sign (#, '7B'X).

Making a Bar Code Decision

Before deciding on which bar code you want to use, there are several things you should ask yourself. These questions and answers to them are presented in the following sections.

Which Symbology?

This decision is sometimes the easiest to make because the industry or application may dictate which symbology must be used. The retail industry, for example, uses UPC or Code 128.

If you may make your own symbology decision, factors such as character set (do you have numeric only or alphanumeric data to encode), density and space available on the printed document must be considered.

What Density?

How much space is available for the bar code? Will the bar code be read by a hand-held scanner used close to the bar code or will it be read at a distance, thereby requiring a lower density bar code with wider bars.

What density is the printer capable of printing? Impact printers tend to print lower density (fewer characters per inch) bar codes than laser printers. Do you have enough space on the document for the density of the bar code the printer is capable of printing? Is there a sufficient quiet zone?

Will your scanner be able to reliably read the bar code density? Most scanners scan with either a small, medium or large scanning dot radius. If your scanner has a large scanning dot and the bar code has a high density (narrow bars and spaces) or vice-versa, the bar code may not scan reliably.

What Height?

Will the bar code be read by a hand-held wand? If it will, the aspect ratio may need to be changed to produce a bar code with taller bars.

Using picket fence orientation as an example, it is more difficult to scan a long (width), short (height) bar code with a wand than with a laser gun. How much space is available? Do bearer bars have to be included in the height?

What Orientation?

What space on the document is available? Does available space dictate bar code orientation? If the bar code is being mechanically scanned, is there a requirement for a specific orientation? Is there more than one bar code on the label or document and should each bar code be in a different orientation to simplify scanning.

Laser printers sometimes experience a quality reduction called *keystoning*. Keystoning is a condition where the leading or trailing edge of a character (relative to the movement of the paper through the printer) tends to fade away and does not have a sharp boundary. This is usually noticeable on the bottom edge of a line of text or a bar.

If the bar code is printed with the picket fence orientation, keystoning makes little difference because the loss of quality is at the top or bottom of the bars and it will have minimal affect on scanning the bar code.

If the bar code is printed with the ladder orientation, then the keystoning can affect the leading or trailing edge of each bar and cause serious first read rate problems.

What Print Volume?

How many bar codes must be printed? Do you need to print them multiple-up? How does this affect printer performance?

What Print Window?

How much time is available for bar code printing? Can the bar codes be printed batch or must they be printed on demand? Are multiple printers necessary for small print windows or for backup requirements?

Using Bar Codes on the AS/400

All of the major bar code symbologies are supported on AS/400 directly, using the Bar Code Object Content Architecture (BCOCA). Most of the AFP application enabling tools provide an interface for specifying bar codes. The DDS keyword BARCODE is one example. The figures in this chapter are examples of bar code printing using the BARCODE keyword.

DDS Source for BARSMP Example

The following example shows the printer file DDS (BARSMP) source that produced the samples in this chapter. Creating bar codes is relatively easy, you only need to specify the application field, the BARCODE keyword, and the type of bar code desired.

```
5763PW1 V3R2M0 960917          SEU SOURCE LISTING  03/03/96 17:48:14      1
SOURCE FILE . . . . . SAMPLER/QDDSSRC
MEMBER . . . . . BARSMP
SEQNBR*...+... 1 ...+... 2 ...+... 3 ...+... 4 ...+... 5 ...+... 6 ...+... 7 ...+... 8
100      A* BARSMP: DDS for Bar Code Sample program
200      A*
300      A*   Printer File Create Parameters:
400      A*   - Printer Device Type (DEVTYPE)      *AFPD5
500      A*
600      A* Format of BARCODE keyword is as follows:
700      A*
800      A*   BARCODE (Type Height + 6 parameters:
900      A*           Horizontal/Vertical      *HRZ, *VRT
1000     A*           Human Readable          *HRI, *HRITOP, *NOHRI
1100     A*           Asterist (for 3 of 9)    *AST, *NOAST
1200     A*           Check Digit              (type)
1300     A*           Unit Width                (width of narmor bar/space)
1400     A*           Wide/Narrow Ratio        (value from 2.00-3.00)
1500     A*
1600     A           R TITLE                    LPI(8)
1700     A 11       TLE1                        50      18SKIPB(4)
1800     A           SPACEA(4)
1900     *
2000     A           R BARCODE                  LPI(8)
2100     A           HEAD2                      30      48
2200     A           HEAD1                      30      9
2300     A           SPACEA(1)
2400     A 12       CD12@1                      11S     11BARCODE(UPCA 4)
2500     A 12       CD12@2                      12S     50BARCODE(EAN13 4)
2600     A 12       SPACEA(9)
2700     *
2800     A 13       CD13@1                      10S     11BARCODE(INTERL20F5 4)
2900     A 13       CD13@2                      10S     50BARCODE(MATRIX20F5 4)
3000     A 13       SPACEA(9)
3100     *
3200     A 14       CD14@2                      10A     50BARCODE(CODEABAR 4)
3300     A 14       CD14@1                      10S     11BARCODE(INDUST20F5 4)
3400     A 14       SPACEA(9)
3500     *
3600     A 15       CD15@1                      11A     11BARCODE(CODE30F9 4)
3700     A 15       CD15@2                      10S     50BARCODE(MSI 4)
3800     A 15       SPACEA(9)
3900     *
4000     A 16       CD16@1                      11A     11BARCODE(CODE128 4)
4100     A 16       CD16@2                      8A      66BARCODE(CODE128 9 *VRT +
4200     A           (*WIDTH .03))
4300     A 16       SPACEA(10)
4400     *
4500     A 17       CD17@1                      5S      11BARCODE(POSTNET)
```

```

4600      A  17              SPACEA(4)
4700      A  18      CD18@1      9S      11BARCODE(POSTNET)
4800      A  18              SPACEA(4)
4900      A  19      CD19@1      11S      11BARCODE(POSTNET)
          * * * *  E N D   O F   S O U R C E   * * * *

```


Printing Bar Codes on IPDS Printers

IPDS provides an interface to APA printers that enables the mixture of different data types, including text, image, graphics, and bar codes. The data carried by each of these types is defined by a data object. The bar code object contains Bar Code Object Content Architecture (BCOCA) data controls that provide the ability to describe a specific bar code, supply the data to be coded, and enable the IPDS printer to decide what is needed to construct and print the bar code.

Because the IPDS printer constructs the bar code, the same IPDS commands sent to IPDS printers from different technologies produce similar output. This enables you to write the bar code application with little concern about what IPDS printer will be used for output.

Figure 38 shows Postnet and Interleaved 2 of 5 bar codes on the Super Sun Seeds sample invoice.

400 CPU Parkway
Vegetation, NJ 55090



**Super
Sun
Seeds**
A Growth Company

Office: 555-499-2367
Fax: 555-415-9794

LOS ARBOLES DEL MUNDO
32483 ARBOL LANE
MESA VERDE
IL 65478-9390

SAME

-- Ship To --

Customer Number: 141


Invoice Number: 31341

Invoice Date: 7/28/95

Payment Date: 8/28/95

Ship Via: Ship Date: 7/28/95 Terms: N10 Salesman: MICHELE GOODACRE

	UOM	Item #	Item Description	Price	Extension
1000	BX	56413213	POT POT	7.65	7,650.00
45	BZ	11005015	CHANTENAY SEEDS	2.19	98.55
900	EA	00001200	ARBOLES DEL SUR	45.00	40,500.00
98	PK	84512023	OREGON SPRING TOMATO SEED	.97	95.06
4	BX	11057893	AFRICAN DAISY, SEEDS	2.35	9.40
951	CT	11005011	LISSO RED SEEDS	892.23	48,510.73
46	DZ	11005014	SCARLET NANTES SEEDS	5.90	271.40
100	EA	31321655	SEMILLAS DEL SUS SOMBEROS	24.95	2,495.00



*Thank You
Because almost half of
your order was Lasso Red
Seeds, you will receive
a 10% discount on your
next order.*

Total Due


\$99,630.14

Return this tear-off strip with your payment.

Make Checks Payable to: **Super Sun Seeds**

Payment is due by: 8/28/95 Amount Due is: \$99,630.14

LOS ARBOLES DEL MUNDO
32483 ARBOL LANE
MESA VERDE
IL 65478-9390



0001410099630146

Figure 38. Bar Codes Printed on an IPDS Printer

Printing Bar Codes Using Fonts

Some IPDS printers, such as the IBM 3825, 3827, 3828, 3829, and 3835, do not support the Bar Code Object Content Architecture. In such cases, bar codes can be constructed using fonts. This involves having the bar code characters fully formed; that is, created with all required bars and spaces that represent the given bar code character.

When printing bar codes as a font:

- The application program is responsible for generating any check digits, or start or stop characters, such as the asterisk (*) in Bar Code 3 of 9.
- The printer does not have to generate or calculate anything; it merely places characters on the page as if it were printing text. The characters, however, look like bars, not like the alphabet.

Figure 39 shows an example of bar codes using Fonts.

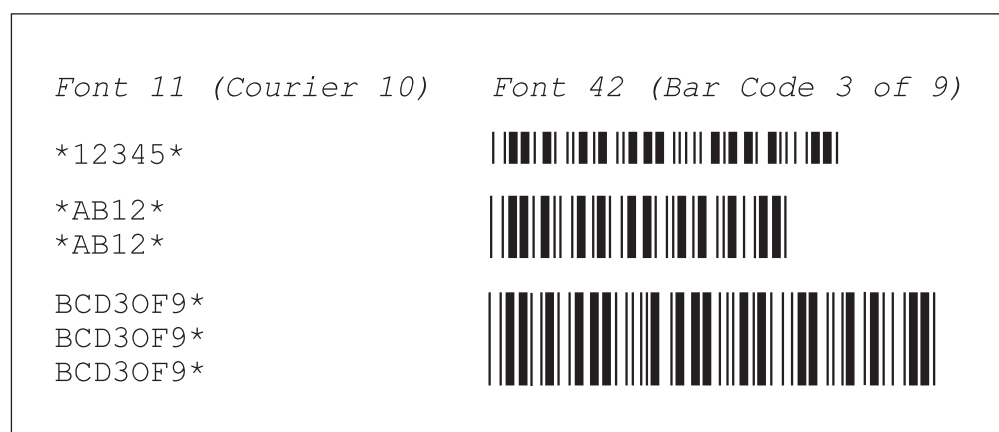


Figure 39. Example of Code 3 of 9 Bar Code Using Fonts

Bar Code Font Sources

Bar code fonts that can be used on IBM printers can be purchased either from the IBM Printing Systems Company or from an IBM business partner.

Bar Codes with IBM Advanced Function Printing Utilities for AS/400

The Overlay Utility and the Print Format Utility of the IBM Advanced Function Printing Utilities for AS/400 (AFP Utilities) can be used to print bar codes. You can specify bar codes when you build an overlay with the Overlay Utility or when you format data with the Print Format Utility. Bar codes supported by AFP Utilities are the same as those supported by DDS.

The following display examples illustrate how bar codes are specified in Print Format Utility.

Change Bar Code Detail		
Mark: *C003	Measurement method: Inch	
Type choices, press Enter.		
Position:		
Across	1.40	0.00-22.75
Down . . . . .	.66	0.00-22.75
Bar code type	9	1=CODE30F9, 2=MSI, 3=UPC-A
		4=UPC-E, 5=EAN-8, 6=EAN-13
		7=INDUST25, 8=MATRIX25
		9=INTERL25, 10=CODABAR
		11=CODE128, 12=POSTNET
		13=ROYAL MAIL, 14=JPBC
		15=AUSTRALIA POST
Bar code data	&ITM1.	
Element		F4 for list
		Name
		More...
F3=Exit	F4=Prompt	F5=Refresh
F6=Change measurement method	F12=Cancel	

Figure 40. Change Bar Code Detail Display

Change Bar Code Detail		
Mark: *C003	Measurement method: Inch	
Type choices, press Enter.		
Degree of rotation	0	0, 90, 180, 270
Color	*DEFAULT	*DEFAULT, 1=Blue, 2=Red
		3=Magenta, 4=Green, 5=Cyan
		6=Yellow, 7=Brown, 8=Black
Check digit	N	Y=Yes, N=No
HRI	3	1=Below, 2=Above, 3=No
HRI font	*DEFAULT	*DEFAULT, 1-8, F4 for list
Module width	*DEFAULT	*DEFAULT, 0.001-0.254
Element height	*DEFAULT	*DEFAULT, 0.01-22.75
Wide to narrow ratio	*DEFAULT	*DEFAULT, 2.00-3.00
		Bottom
F3=Exit	F4=Prompt	F5=Refresh
F6=Change measurement method	F12=Cancel	

Figure 41. Change Bar Code Detail Display

Usually, you specify the field and positioning. Optionally, you can specify changes to the bar code characteristics, such as height, width factors, and whether human-readable information (HRI) is printed above or below the actual bar coding.

If bar codes are required in an AFP Utilities application, but the target printer does not support the IPDS bar code object, AFP Utilities generate draw rule bar codes that do not require BCOCA support. AFP Utilities make the draw rule decision based on the printer type selected in the form specification. Bar codes also can be printed as fonts with bar code fields shown in form layouts as font changes rather than bar code elements.

The major difference between bar codes specified in the Overlay Utility and those specified in the Print Format Utility is that the Overlay Utility bar codes are fixed (static). One bar code value can be specified for each bar code field, and the value never changes. The same bar code prints on every form.

Print Format Utility bar codes, on the other hand, can be either fixed or variable (dynamic). Variable bar codes can change with each record, producing a unique bar code for each form.

Bar Codes with Advanced Print Utility

Advanced Print Utility has an interface to bar codes very similar to AFP Utilities. The following examples illustrate pop-up displays used to define bar code data.

```
Define Field Mapping
: .....
:                               Edit Bar Code Mapping
:                               :
: Type choices, press Enter.  :
:                               :
: From Row / Column :    15 / 16
: Bar code data . . :    45789-2637
:                               :
: Position across . . 1.25    *INCH    Value
: Position down . . . 1.9     *INCH    Value
:                               :
: Rotation . . . . . *DEFAULT        *DEFAULT, 0, 90, 180, 270
: Color . . . . .    *PRTDEF         *PRTDEF, Value F4 for list
:                               :
: Bar code type . . . 12             Value F4 for list
:                               :
:                               :
:                               : More...
: F4=Prompt          F12=Cancel      F15=Repeat
: F16=Delete         F22=Set Units
:                               :
: .....
: .....
```

Figure 42. Define Bar Code in Advanced Print Utility

In the last example, we mapped a field in the SCS output file (in this case, the zip code) to bar code. Again, you can specify type, positioning, size, and other factors to control exactly how the bar code prints.

```
Define Field Mapping
: .....
:                               Edit Bar Code Mapping
:                               :
: Type choices, press Enter.  :
:                               :
: Bar code type . . . :    12 - POSTNET
: Bar code data . . . :    45789-2637
:                               :
: Length . . . . .    10             1-50
:                               :
: POSTNET Type . . . 4              1=ZIP Code,
:                               : 2=ZIP+4 Code,
:                               : 3=Advanced Bar Code,
:                               : 4=Variable length data
:                               :
:                               :
:                               : Bottom
: F12=Cancel
:                               :
: .....
: .....
```

Figure 43. Define Bar Code in Advanced Print Utility

Chapter 9. Electronic Forms (Overlays)

An electronic form, or overlay, is a collection of constant data stored as an AFP resource and primarily used in place of preprinted forms.

An overlay can include some or all of the following elements:

- Vertical, horizontal, and diagonal rules
- Rules with different weights and thickness
- Boxes with and without shading
- Grids, arcs, and polygons
- Graphics or image, such as company logos
- Bar codes
- Text
 - Different inline directions and character rotations for text
 - Different fonts, including fonts not used in the print file

Figure 44 shows an example of an overlay.


400 CPU Parkway Vegetation, NJ 55090		 Super Sun Seeds A Growth Company		Office: 555-499-2367 Fax: 555-415-9794	
-- Sold To --					
-- Ship To --					
Customer Number:		Invoice Number:		Invoice Date:	
Ship Via:		Ship Date:		Payment Date:	
Terms:		Salesman:			
Qty	UOM	Item #	Item Description	Price	Extension
Total Due					
Return this tear-off strip with your payment. Payment is due by:			Make Checks Payable to: Amount Due is:		

Figure 44. Electronic Form (Overlay) on the Sample Page

Why Use an Overlay?

Overlays facilitate complete electronic printing. They replace preprinted forms, a manual printing process. Electronic forms provide significant benefits over preprinted forms including:

- No forms inventory
- No obsolete forms
- Faster turnaround for new forms
- Less operator intervention

However, the benefits of electronic forms and electronic printing go far beyond production cost savings. With electronic documents, you can:

- Re-engineer business processes, such as changing workflow with bar codes
- Respond to vendor or supplier requirements
- Create effective, competitive documents

Options for Building Electronic Forms

There are many alternatives available for creating electronic overlays to be used in AFP printing applications. The options differ both in cost and in function. It is important to evaluate your requirements to select what best suits your needs. You should evaluate how many forms you will be creating, as well as how complex they will be.

Some of the options available include:

- Overlay Utility, part of IBM Advanced Function Printing Utilities for AS/400
- IBM AFP Printer Driver for Windows
- PC-based Forms Design tools, such as ISIS and ELIXIR
- Forms transferred from other systems
- DDS (overlay equivalent using text, line, box, and paged keywords)
- Services from IBM, and other companies

Designing Overlays Using the IBM Advanced Function Printing Utilities for AS/400 Overlay Utility

The IBM Advanced Function Printing Utilities for AS/400 (AFP Utilities) are comprised of three utilities designed to assist in the building of AFP applications. One of these is the Overlay Utility, which can be used to design electronic forms, or overlays, from any AS/400 terminal. The Overlay Utility builds the overlay online, pulling in the specified AFP resources (fonts, images) directly from AS/400 libraries.

To use the Overlay Utility, select option 1 from the AFP Utilities Main menu, which is shown in Figure 45 on page 101.

```

AFPU          IBM Advanced Function Printing Utilities for AS/400

Select one of the following:

  Overlay Utility
    1. Work with source overlays
    2. Work with source overlay files

  Print Format Utility
    11. Work with PFD definitions
    12. Work with PFD definition files
    13. Print database file member
    14. Print AFP Utilities tutorial

  Resource Management Utility
    21. Convert to page segment
    22. Work with overlays
    23. Work with page segments

Selection or command
===> 1
F3=Exit  F4=Prompt  F9=Retrieve  F12=Cancel  F16=System main menu

```

Figure 45. AFPU Main Menu

When you select option 1 on the AFP Utilities main menu, the following display appears. From this display you can specify which overlay you will be working with:

```

                                Work with Source Overlays

File . . . . . QOVL SRC      Name, F4 for list
Library . . . . . SAMPLER     Name, *LIBL, *CURLIB
Source overlay . . . . . *ALL  Name, generic*, *ALL
Position to . . . . .          Starting characters

Type options, press Enter.
  1=Create  2=Change  3=Copy  4=Delete  6=Print  7=Rename
  9=Create overlay

      Source
Opt  Overlay      Text                                     Changed
-----
      GRID        Grid Overlay - 10CPI/6LPI                03/01/96
  2  INVALL       Invoice: 1-page overlay                    03/01/96
      INVBAC       Invoice: Terms and Conditions Back overlay 03/01/96
      INVFAST      Invoice: First page                        03/01/96
                                           More...

Parameters or command
===>
F3=Exit  F4=Prompt  F5=Refresh  F9=Retrieve  F11=Display names only
F12=Cancel

```

Figure 46. Work with Source Overlays Display

Figure 47 on page 102 shows the Super Sun Seeds INVALL overlay on the “screen view” (Design Overlay) display of the Overlay Utility. Overlay elements such as lines, boxes, graphics, page segments, text, and bar codes are designed, or placed, on the overlay, usually by row and column position.

```

                                Design Overlay                Columns:  1- 74
Control  . .                Source Overlay  . . . . . INVAL
*...+...1...+...2...+...3...+...4...+...5...+...6...+...7...
001
002
003      *B001 -----*S051 -----
004      :
005      :                                *T025
006      :                                *T052
007      :      *T027 U Parkway                                *T029 : 555-4
008      :      *T028 tion, NJ      55090      *T053      *T030  555-41
009      *L002 -----*T026 th Company-----
010      :      *L005                                *L009  *L015
011      :      :                                :      :
012      :
013      :
014      :
015      :      *L006                                :      *L012
016      :      *L007                                *L011  *L013
017      *L003 -----*T016 d To -----*T017 p To -----
                                                More...

F3=Exit      F6=Text      F9=Line      F10=Box
F11=Bar code  F21=Element edit  F22=Block edit  F24=More keys

```

Figure 47. Design Overlay Display

On the Design Overlay display, you can select a particular element (in this case, S051, the Super Sun Seeds page segment that appears at the top of the INVAL overlay). A pop-up screen appears, enabling you to change the page segment name and position. You can duplicate elements multiple times by pressing a function key (F13) and specifying the number of repetitions and distance from the start of one element to the start of the next.

```

                                Design Overlay                Columns:  1- 74
Control  . .                Source Overlay  . . . . . INVAL
*...+...1...+...2...+...3...+...4...+...5...+...6...+...7...
001
002
003      *B001 -----*S051 -----
004      :
005      :                                *T025
006      :                                *T052
007      :      *T027 U Parkway                                *T029 : 555-4
008      :      *T028 tion, NJ      55090      *T053      *T030  555-41
009      *L002 -----*T026 th Company-----
010      :      *L005                                *L009  *L015
011      :      :                                :      :
012      :
                                                More...

                                Change Page Segment
Mark . . . . . : *S051      Measurement method . . . . : Inch
Position . . . . Across      3.40  Down      .45
Page Segment . . . SUNLOGO  Name
F3=Exit      F4=Detail      F6=Change measurement method
F12=Cancel   F13=Repeat element  F24=More keys

```

Figure 48. Design Overlay Display

The Overlay Utility can overlay a row and column grid to assist in the proper placement of these design elements. When elements are placed, defined, or changed, F4 may be used to specify additional detail for the element. Detail displays appear, and you are prompted for more information, such as font selection for text fields.

Figure 49 shows the alternative presentation of the overlay elements, which is the list view. Use F17 to toggle between the screen view and list view. List view gives you a summarized view of the overlay, and enables you to create, change, move, copy, remove and restore individual elements.

Design Overlay										
Control . . .			Source Overlay			Parameters				
NBR	ID	NAME	M	ACROSS	DOWN					INVALL
001	B		1	6	3	END ACROSS=	80	END DOWN =	49	
002	L		1	6	9	END ACROSS=	80	END DOWN =	9	
003	L		1	6	17	END ACROSS=	80	END DOWN =	17	
004	L		2	0.800	1.500	END ACROSS=	1.000	END DOWN =	1.500	
005	L		2	0.800	1.500	END ACROSS=	0.800	END DOWN =	1.660	
006	L		1	9	15	END ACROSS=	9	END DOWN =	16	
007	L		1	9	16	END ACROSS=	11	END DOWN =	16	
008	L		2	3.900	1.500	END ACROSS=	3.900	END DOWN =	1.660	
009	L		2	3.700	1.500	END ACROSS=	3.900	END DOWN =	1.500	
010	L		1	40	15	END ACROSS=	40	END DOWN =	16	
011	L		1	38	16	END ACROSS=	40	END DOWN =	16	
012	L		1	45	15	END ACROSS=	45	END DOWN =	16	
013	L		1	45	16	END ACROSS=	47	END DOWN =	16	
014	L		2	4.400	1.500	END ACROSS=	4.600	END DOWN =	1.500	
015	L		2	4.400	1.500	END ACROSS=	4.400	END DOWN =	1.660	
016	T		2	2.000	2.660	FONT=0	-- Solid To --			
										More...
F3=Exit			F6=Text			F9=Line			F10=Box	
F11=Bar code			F13=Place			F14=Change			F24=More keys	

Figure 49. Design Overlay Display in List View

In the following two figures, displays for changing the detail information for a box element are shown:

Change Box Detail		
Mark: *B001	Measurement method:	Row/Column
Type choices, press Enter.		
Start position:		
Across	6	1-999
Down	3	1-999
End position:		
Across	80	1-999
Down	49	1-999
Element		Name
Line type	1	1=Solid, 2=Dashed, 3=Dotted
Line width	*NARROW	*NARROW, *MEDIUM, *WIDE
		0.00-1.00
Line placement	1	1=Middle, 2=Border
More...		
F3=Exit	F4=Prompt	F5=Refresh
F6=Change measurement method		F12=Cancel

Figure 50. Change Box Detail Display

Change Box Detail		
Mark: *B001	Measurement method:	Row/Column
Type choices, press Enter.		
Shading:		
Pattern		1=Standard, 2=Screen
Type	*MEDIUM	*LIGHT, *MEDIUM, *DARK
		0.01-100.00 (%)
Text:		
Text data		
		More...
F3=Exit	F4=Prompt	F5=Refresh F6=Change measurement method F12=Cancel

Figure 51. Change Box Detail Display

Viewing Overlays with the *VIEW Command

You can now view electronic forms as you design them if you are working on a programmable workstation—a PC, for example. The VIEW command dynamically calls the Client Access/400 from AFP Utilities, enabling you to view the form in a separate window.

This capability requires the following:

- A programmable workstation connected to the AS/400 system on which the source overlay resides, with either an SNA or TCP/IP connection.
- Client Access for OS/400 (CA/400), V3R1M3 or later, installed.
- AFP Workbench Viewer installed on the workstation. AFP Workbench is included in the current version of CA/400.
- Matching USERIDs. The USERID specified in the CA/400 configuration to access the AS/400 must match that used to sign on to the AS/400 session (unless the USERID has all-object authority).

Notes:

1. If you are running CA/400 on Windows 3.1 or OS/2, you must set up AFP Workbench Viewer. Refer to “Appendix C. Setting Up the Client Access/400 Viewer to View AFP Resources” on page 309 for instructions.
2. Included page segments that are not in a library that is in the system library list will not be displayed. Message CWBNP1019, “AFP Resource not found,” will be displayed instead. To view these page segments, do one of the following:
 - Add the library name to the system library list (command CHGSYSLIBL).
 - Copy the page segments to library QGPL (command CRTDUPOBJ).

To view the form, type ***VIEW** in the control field on the Design Overlay screen. During an AFP Utilities session, you can use the VIEW command up to 25 times while designing the overlay. (This command is for source overlays only. It has no function when you are designing page layouts or record layouts.)

Overlays Using the IBM AFP Printer Driver for Windows

The IBM AFP Printer Driver for Windows creates AFP documents, page segments, and overlays out of any Windows application. This driver is part of Client Access/400. The driver is also available on an “as is” basis from IBM. Like any Windows driver, the IBM AFP Printer Driver for Windows uses the Windows GDI

(Graphical Data Interface) and maps Windows document elements to AFP. As such, it is an “intelligent” driver. It can map fonts to fonts and lines and boxes to lines and boxes. Where image is required, the driver uses compressed image. This means that more efficient overlays are created for use on your AS/400.

Figure 52 shows INVBAC, the terms and conditions overlay for the Super Sun Seeds invoicing application.

Terms and Conditions

The sale of the products described herein shall be governed by the terms and conditions contained in any written contract currently in effect between Buyer and Seller covering such sale. If there is no such contract, then Seller hereby offers to sell such products to Buyer only upon the terms set forth herein.

1. *Seller's standard prices in effect at the time of shipment will govern the sale of the products described herein. Terms of payment on any approved order are net thirty (30) days from the date of invoice unless otherwise specifically stated. All shipments, unless specifically provided, shall be f.o.b. place of manufacture or warehouse location indicated hereon. The price includes cost of packaging for domestic shipment, unless otherwise stated. An additional charge will be made for special domestic or export packing if this involves greater expense. Shipments will be insured at the expense of the Buyer unless Buyer specifically requests that shipments not be insured.*
2. *Seller reserves the right among other remedies set forth to terminate this contract or suspend further deliveries under it in the event Buyer fails to pay for any one shipment when same becomes due. Should Buyer's financial responsibility become unsatisfactory to Seller, cash payments or satisfactory security may be required by Seller for future deliveries and for goods theretofore delivered.*
3. *In addition to the purchase price, Buyer shall pay the Seller the amount of all taxes, excises or other charges (except taxes on or measured by net income) that Seller may be required to pay to any Government (national, state or local) with respect to the production, sale or transportation of any product delivered hereunder, except where the law otherwise provides. Sixty (60) days written notification must be given to make any change to delivery schedule.*
4. *Seller warrants that products delivered hereunder will conform to the description on the face of this document and meet any specifications set forth or incorporated by reference herein and will be adequately contained, packaged and labeled and conform to any promises and affirmations of fact made on the container and label. Seller further warrants any such product against defects in workmanship or materials which develop or become evident within 12 (8 months OEM) after shipment of the product by Seller provided Seller's responsibility under this warranty shall be limited to the repair or if Seller so elects the replacement of the defective product or component thereof and that said warranty is subject to the following exceptions and conditions:*
 - (a) *All items claimed to be defective must be returned to Seller; transportation charges prepaid and will be returned to Buyer; transportation charges collect unless found to be defective in which case Seller will pay all transportation charges.*
 - (b) *Seller's warranty will not apply to items which have been modified or repaired without Seller's written consent by persons other than Seller's authorized service personnel.*
5. *It should be noted that Seller has used the powerful tools of AS/400 Advanced Function Printing to create Seller's invoice, and despite the arcane terms and conditions which are presently being read, the invoice is a very effective business document. Any attempt to mar the appearance of this invoice should be discouraged.*
6. *The validity, interpretation and performance of the terms hereof with respect to any product delivered (or to be delivered) hereunder shall be governed by the law of the State of Colorado...*
7. *No modification or waiver of the terms here of shall be binding upon Seller unless approved in writing by one of Seller's Officers or Marketing Managers or shall be affected by acknowledgment or acceptance of purchase order forms containing other or different terms whether or not signed by authorized representative of Seller. (a) Seller does not warrant items which have been damaged due to negligence or misuse.*
8. *THERE ARE NO EXPRESS WARRANTIES BY SELLER OTHER THAN THOSE SPECIFIED IN THIS PARAGRAPH. NO WARRANTIES BY SELLER (OTHER THAN WARRANTY OF TITLE AS PROVIDED IN THE UNIFORM COMMERCIAL CODE) SHALL BE IMPLIED OR OTHERWISE CREATED UNDER THE UNIFORM COMMERCIAL CODE, INCLUDING BUT NOT LIMITED TO WARRANTY OF MERCHANTABILITY IN OTHER RESPECTS THAN SPECIFIED IN THIS PARAGRAPH AND WARRANTY OF FITNESS FOR A PARTICULAR PURPOSE. Without limiting the generality of the foregoing, Buyer assumes all risk and liability for the results obtained by the use of any products delivered hereunder in combination with other articles or material in the practice of any process.*
9. *NO CLAIM of any kind with respect to any product specified herein, whether as to product delivered or for non-delivery of product and whether or not based on negligence, SHALL BE GREATER IN AMOUNT than the purchase price of the product in respect of which such claim is made. In no event shall either party be liable for special indirect or consequential damages whether or not caused by or resulting from the negligence of such party.*
10. *It is expressly understood that any technical advice furnished by Seller with reference to the use of its products is given gratis and Seller assumes no obligation of liability for the advice given or results obtained, all such advice being given and accepted at Buyer's risk.*
11. *In the event Buyer fails to fulfill Seller's terms of payment for the products specified herein, or in case Seller shall have any doubt at any time as to Buyer's financial responsibility, Seller may decline to make further deliveries except upon receipt of cash or satisfactory security.*

Figure 52. Terms and Conditions Overlay Created in a Windows Application

This overlay can be created using a Windows application and was produced in AFP format using the IBM AFP Printer Driver for Windows. To maximize the performance and efficiency of the overlay, it was built using Expanded Core fonts (TrueType or Adobe Type Manager - ATM) that map directly into AFP fonts. Specifically, the text is in Helvetica Italic Medium and Helvetica Italic Bold typefaces in whole number point sizes.

Printing the Overlay to an AFP File

After the overlay has been completed on the PC, you are ready to “print” it to an AFP file. Complete the following procedures:

1. Create an overlay on the PC. You can use any Windows software to create a preprinted form.

2. Print your overlay using the IBM AFP Printer Driver for Windows. Before you can print to the Windows driver, you must set up and use the driver under your Windows application. First, use the standard procedures to install the IBM AFP Printer Driver for Windows. Then, do the following:
 - a. Select **FILE** on the application menu bar.
 Select **PRINT SETUP**.
 Select **Specific printer**.
 Scroll down the list of printers and highlight **AFP 300 on File**.
 - b. Select **OPTIONS**.
 For *Output Type*, highlight **OVERLAY**.
 Select **OK** on the Options window.
 Select **OK** on the Printer Setup window.
 You are now ready to print your overlay, but you do not actually print it. Your output is sent to a file in an AFP overlay format. This file is saved in an AS/400 shared folder (Drive I:), making it accessible to the AS/400 system.
 - c. Select **FILE** on the application menu bar.
 Select **PRINT**.
 Select **OK**.
 - d. You are prompted for an output file name.
 Specify **i:\qdlis\resource\invbac.oly**.
 (You can name it anything you want, but extension **.OLY** is the default extension for overlay.)
 Select **OK**.
3. Create a resource database. To do so, go to an AS/400 command line and create a file to receive these PC resources using the following command:


```
CRTPF FILE(MYLIB/OVERLAY) RCDLEN(8201) +
      MBR(MYOVERLAY) MAXMBRS(*NOMAX) LVLCHK(*NO)
```

The suggested record length is 8201 (32766 is the maximum) and the Level check parameter must be *NO.

The parameter MAXMBRS(*NOMAX) enables you to create the file only once and use different member names to create other overlays later on.
4. Transfer the PC resource to the AS/400 database. Use the CPYFRMPCD command to transfer the PC resource to the AS/400 database. Figure 53 on page 107 shows the display that appears when you use the CPYFRMPCD command.

Copy From PC Document (CPYFRMPCD)

Type choices, press Enter.

From folder > resource_____

To file	> overlay__	Name
Library	mylib__	Name, *LIBL, *CURLIB
From document	> invbac.oly	Name
To member	> myoverlay__	Name, *FIRST, *FROMDOC
Replace or add records	*REPLACE	*REPLACE, *ADD
Translate table	> *NONE__	Name, *DFT, *NONE
Library	_____	Name, *LIBL, *CURLIB
Format of PC data	> *NOTEXT__	*TEXT, *NOTEXT

Bottom

F3=Exit F4=Prompt F5=Refresh F12=Cancel F13=How to use this display
F24=More keys

Figure 53. Copy From PC Document (CPYFRMPCD) Display

Enter the fields on this display as follows:

From folder

Name of the AS/400 folder where you stored the PC print file

To file Name of the resource file you created

From document

Name of the document from which you will make the copy

Translate table

Specify *NONE, the resource should not be translated

Format of PC data

Specify *NOTEXT, the resource is not text

Note: An alternative method would be to FTP the file to the AS/400 and then use the CRTOVL command, omitting the CPYFRMPCD step.

5. Create the Overlay. Use the CRTOVL command to create an AS/400 overlay (object type *OVL). Figure 54 on page 108 shows the display that appears when you use the CRTOVL command.

Create Overlay (CRTOVL)

Type choices, press Enter.

Overlay	> invbac_____	Name
Library	mylib_____	Name, *CURLIB
File	> overlay_____	Name
Library	mylib_____	Name, *LIBL, *CURLIB
Member	*OVL_____	Name, *OVL
Data type	*AFPDS	*AFPDS, *AFPU
Text 'description'	*MBRTXT_____	

Bottom

F3=Exit	F4=Prompt	F5=Refresh	F10=Additional parameters	F12=Cancel
F13=How to use this display		F24=More keys		

Figure 54. Create Overlay (CRTOVL) Display

An alternative to using the individual steps described above is to build and use the OVERLAY command (see “Appendix I. AS/400 SEGMENT and OVERLAY Commands” on page 343). The following figure shows the OVERLAY command display.

Create/Print Overlay (OVERLAY)

Type choices, press Enter.

Folder	resource	
Full Document Name	invbac.oly	Character value
Overlay Description	Terms and Conditions	
Overlay Library	sampler	Character value
Overlay Name	invbac	Character value
Resolution	'*300'	*240, *300
Display Overlay	*YES	*NO, *YES
Output Queue	'*JOB '	Character value
Output Queue Library	'*LIBL'	Character value
Replace Existing Overlay	*YES	*NO, *YES
Record Length	2313	Number

Bottom

F3=Exit	F4=Prompt	F5=Refresh	F12=Cancel	F13=How to use this display
F24=More keys				

Figure 55. Create/Print Overlay Prompt from OVERLAY Command

The OVERLAY command automates the individual commands and produces a printed proof of the overlay. You can also use the OVERLAY command to launch the Client Access/400 Output Queue Viewer and display your overlay.

Overlays from Other IBM Systems

Because Advanced Function Presentation is a system and printer-independent architecture, AFP overlays from other systems can be transferred to AS/400. For

example, overlays can be created on MVS using a variety of tools, including the Overlay Generation Language (OGL). Regardless of how the overlay is created, the AFP data stream is the same. One difference, however, between MVS and AS/400 is the use of variable length records. MVS supports the use of variable length records and AFP resources (overlays, fonts, page segments) are built in that format.

Therefore, the one extra step, when transferring via SNA from MVS, (in addition to the basic tape copy or communications transmission) is the conversion to fixed length records. You can make this conversion most easily on MVS.

The two basic tasks involved in moving an overlay to the AS/400 are:

1. Transmit a copy of the file.
2. Create the overlay.

The method for transmitting a file varies according to which of the following protocols you use:

- SNA
- TCP/IP

Both methods for transmitting and the common step for creating the overlay are detailed in the following sections.

Transmitting via SNA

When using SNA to transfer a file from MVS, follow these steps:

1. Enter the basic SNA transmit command:
`XMIT NODE.USERID DA(LEVEL1.LEVEL2 (MEMBER)) SEQ`
2. Run RCVNETF on AS/400 to place the member in a physical file of the same fixed record length.

Transmitting via TCP/IP FTP

When using TCP/IP, you transfer the file by FTPing it. Complete the following instructions to FTP the file. The basic FTP commands are printed in bold.

1. **ftp xxxxx** (xxxxx = system name or IP address that you are accessing)
2. Enter Login User ID.
3. Enter Password.
4. **bin** (to set binary image mode)
5. **put XXXXX.savf (replace** (XXXXX is the name of the resource to be sent to AS/400. Replace parm needed if the file exists on remote system.)
6. **quit** (to end FTP session)

Other useful FTP commands:

- **lpwd** = local directory
- **pwd** = remote directory (Library on AS/400)
- **get** = get file from remote system and place on local system
- **ls** or **dir** = list files
- **mget** or **mput** = get or put multiple file (Example: mput afp*)
- **help** = list of commands available on this server

Creating the Overlay

After you have transmitted the file, you can create the overlay.

Create the overlay using the **CRTOVL** command.

Transferring other AFP Resources

You can transfer other AFP resources in the same manner. The only difference is the final resource creation command. The commands are:

- **CRTFORMDF** Create Form Definition
- **CRTPAGDFN** Create Page Definition
- **CRTPAGSEG** Create Page Segment
- **CRTFNTRSC** Create Font Resource

Overlays Using Business Partner Products

You can use a number of other electronic form products to create overlays for your AS/400 printing applications.

Elixir/400 for AFP

Elixir/400 for AFP is a professional, Windows-based electronic forms design system from Elixir Technologies. Elixir/400 downloads and uses AS/400 form, font, and image resources in the overlay design process, to provide full fidelity. The Elixir family of electronic document products includes font, image, scan, and application build modules.

ISIS Forms Designer

ISIS Forms Designer is a professional, Windows or OS/2 electronic forms design system from ISIS. Forms Designer works internally in AFP format, ensuring absolute accuracy and fidelity (what you see is what you print). ISIS has font, image, and application build modules.

Transform/400

Transform/400 is a low-cost, Windows-based electronic form design system from Mips Dataline America. Transform/400 starts by scanning the existing preprinted form, using an OCR (Optical Character Recognition) engine to automatically create the electronic form. Transform/400 works internally with the IBM AFP Printer Driver for Windows to produce AFP overlays.

Note: This list is in no way meant to be exhaustive. Many other electronic form products are available today.

Overlays Using DDS and the AFP Toolbox

DDS provides most of the elements used in designing electronic forms, such as fonts, lines, boxes, images, and bar codes. For some applications, it may make sense just to use DDS to build all or part of the electronic form. For example, simple forms, such as letterhead overlays, are easily created with DDS. A more common application would involve electronic documents in which portions of the document are handled by an overlay and portions are handled by DDS. You also can use DDS to construct “floating” overlays. A floating overlay is one in which part

of the form is placed at different locations (floats) on the output page. See “Chapter 11. Using Data Description Specifications” on page 127 for an example of a floating overlay.

The AFP Toolbox, a module in the AFP PrintSuite family, can also be used to produce dynamic overlays or documents. With AFP Toolbox, you have complete control over the AFP data stream, enabling you to create any kind of variable formatted document. Although DDS and AFP Toolbox are both programming interfaces to electronic output, AFP Toolbox requires greater programming and AFP skills to use. It also provides greater functionality.

Designing an Electronic Form

With most electronic forms, the design process includes some amount of planning, measuring, and positioning. For example, in designing the Super Sun Seeds example overlays, you would:

- Determine the positioning of key elements (you can use a positioning grid overlay to aid in this process)
- Determine the fonts to be used
- Design and create any image to be placed within the overlay
- Determine the design sequence, particularly if the overlay has many contiguous lines and boxes
- Ensure that overlay elements map to the application data

In the Super Sun Seeds example, the application data is produced in traditional row and column format, with standard vertical spacing of 6 lines to the inch and 10 characters per inch horizontally. If the overlay is designed with the same measurement grid, then it should match with the application data (and be far easier to produce).

Using Overlays on the AS/400

Overlays can be included in AS/400 printing applications using many different techniques, including:

- Specifying them as front or back overlays in the printer file
- Specifying them directly with the DDS OVERLAY keyword
- Specifying them with Advanced Print Utility
- Specifying them with AFP Toolbox
- Placing them in a print application with the Print Format Utility (a module of AFP Utilities)
- Specifying them within a page and form definition object
- Using them with an OfficeVision/400 document
- Using them as cover sheets in Facsimile Support for AS/400

Design and Performance Considerations

Printing a full-page graphical document at high resolutions requires significantly more processing on the part of the AS/400 and the printer than printing one line at low resolution. Performance is not usually a concern in the line-mode printing process, but it is certainly a consideration when you are building and printing electronic documents.

AFP, with its structured data stream, object-based architecture, high-function print managers, and integrated printers, can provide a major performance advantage. The overall process of printing can be split into its component parts. For example, IPDS printers offload from the AS/400 the work of translating font, image, and bar code objects into fully resolved (that is, complete bit patterns ready to print) document pages. Additionally, the PSF/400 print manager keeps track of what font, image, and overlay resources are already stored in the printer.

Still, it is important to design applications with performance in mind. Because overlays include most of the elements of an electronic output document, performance factors should be considered, but be balanced against the business or design requirements of the application.

Design decisions that impact performance include those described in the following sections.

Fonts

When AS/400 host-resident fonts are downloaded to the printer, time and printer memory usage must be considered. Large raster fonts and large numbers of fonts can adversely affect performance. Consider doing the following:

- Minimize the number of fonts used. Document effectiveness normally suffers when more than 6-8 fonts are used on a page.
- Standardize fonts used across applications. Setting some organizational standards with respect to fonts will improve both performance and document effectiveness.
- Use outline fonts. Outline fonts have one scalable object for all point sizes. Raster fonts have a separate object for each point size. As more outline fonts become available on AS/400 (both host and printer-resident), consider using them instead of their raster equivalents.
- Use printer-resident fonts. Printer-resident fonts eliminate the download time that AS/400-resident fonts require. The AFP Utilities Overlay Utility enables you to specify fonts by Font Global ID (FGID), which map to specific printer-resident fonts. Refer to *AS/400 Printer Device Programming* for more information on printer-resident fonts.
- Use font capturing. Font capturing enables the printer to dynamically store a host-downloaded font. The captured font then acts like a printer-resident font. Printing performance is improved by eliminating subsequent font downloads to the printer. The performance improvement will be especially noticeable if you are using double byte fonts.

Image

Because of sheer size, image can affect performance in transmission, printing, and printer memory requirements.

Consider doing the following:

- Minimize the use of image. Do not use larger size page segments than the document really requires.
- Use compressed image. Be sure that you have created compressed image when creating IOCA page segments. Note that some older printers do not support compressed image.
- Use the same image across applications. If possible, standardize your logo to one size so that it may be used with little performance cost across applications.

Sub-Forms

If you have a series of forms that are similar, consider breaking out common sections into a partial overlay, or sub-form. This approach will also reduce the maintenance of these forms.

Object Size

Certain design or object creation processes may generate larger than expected overlay or image objects. For example, a large page segment might indicate that it was created without image compression, or some overlay characteristics such as shading may affect object size or object performance.

Implementing all of these performance recommendations may create a high-performance electronic overlay, but an ineffective document. In addition, your operational environment should also be considered. If you are printing 1000 Super Sun Seeds invoices, then a few extra seconds at the start of the print job will not matter. However, if your application is printing only one invoice at a time, then every second at job initialization is another second of waiting for that one invoice to print.

Chapter 10. Using Printer Files

Printer files on the AS/400 system define how the system handles output from application programs. The actual output itself is contained in the spooled file, which resides within an output queue. Every job on the AS/400 has an associated printer file, whether or not you explicitly create one.

Note: Jobs that do not have an option to generate spooled output, whether those jobs are interactive or batch, do not require printer files. However, every application that generates spooled output must use a printer file to do so.

Printer files can contain two different types of information: parameters that apply to the entire spooled file and control how spooled file data is processed; and printer Data Description Specifications (DDS), which actually define how application data is positioned on the output page. The first set of output information, the printer file parameters, are part of any printer file on the system. The second set, the printer DDS, is optional and exists if the application program has externally-described output.

Printer File Flow

Because most application output on AS/400 is spooled, you have two opportunities to affect how output is finally produced: while the application is building the spooled file, and while the output is on the spooled file waiting to be printed.

Figure 1 on page 13 shows the general flow of print data streams from application program through spooled file and on to the printer. If you want to affect how your output is handled from the application program to the spooled file, use the create, change, and override printer file commands prior to processing the application. Usually, you issue the OVRPRTF command to temporarily change the print attribute parameters to be used by the application program.

Figure 56 on page 116 shows the Override with Printer File command screen, depicting only a portion of the parameters that can be modified. The Change Printer File command (CHGPRTF) permanently changes printer file parameters.

Override with Printer File (OVRPRTF)

Type choices, press Enter.

Coded font CDEFNT

Library *LIBL

Degree of page rotation PAGRTT

Pages per side MULTIUP

Reduce output REDUCE

Print text PRTTXT

Hardware justification JUSTIFY

Print on both sides DUPLEX

Unit of measure UOM

Front side overlay: FRONTOVL

Overlay

Library *LIBL

Offset down 0

Offset across 0

More...

F3=Exit F4=Prompt F5=Refresh F10=Additional parameters F12=Cancel

F13=How to use this display F24=More keys

Figure 56. Override with Printer File (OVRPRTF)

After the application has written the spooled file to the output queue, you can still change a number of the attributes of the spooled file itself, including the output queue and spooled file save, for example, as well as change how the spooled file is printed. You use the Change Spooled File Attributes (CHGSPLFA) command, as shown in the display example below, to make those changes.

Figure 57 shows the display that appears when you use the CHGSPLFA command.

Change Spooled File Attributes (CHGSPLFA)

Type choices, press Enter.

Align page *SAME *SAME, *NO, *YES

Print quality *SAME *SAME, *STD, *DEVD, *DRAFT...

Form feed *SAME *SAME, *DEVD, *CONT, *CUT...

Print fidelity *SAME *SAME, *ABSOLUTE, *CONTENT

Print on both sides *SAME *SAME, *NO, *YES, *TUMBLE...

Pages per side *SAME 1-4, *SAME

Front side overlay:

Overlay *SAME Name, *NONE, *SAME

Library Name, *LIBL, *CURLIB

Offset down *SAME 0.00-57.79, *SAME

Offset across *SAME 0.00-57.79, *SAME

Back side overlay:

Overlay *SAME Name, *FRONTOVL, *NONE, *SAME

Library Name, *LIBL, *CURLIB

Offset down *SAME 0.00-57.79, *SAME

Offset across *SAME 0.00-57.79, *SAME

More...

F3=Exit F4=Prompt F5=Refresh F12=Cancel F13=How to use this display

F24=More keys

Figure 57. Change Spooled File Attributes (CHGSPLFA) Display

Printer File Parameters

Printer file parameters provide a wide range of printing functions, from the basics of managing the spooled file to options that will transform simple line output to advanced electronic output.

With spooled file-level parameters you can:

- Specify or change the output queue
- Specify whether a spooled file is saved or held
- Specify the printer device or device type, including changing from one type of printer type to another (for example, SCS to IPDS)
- Specify the input drawer and output bin, for page printers
- Specify simplex or duplex

You can use the parameters affecting printed lines to:

- Specify the default font for printed output
- Specify the characters per inch (CPI) and lines per inch (LPI)
- Specify the page size and page rotation
- Specify front and back margins or offsets for the printed lines

With Advanced Function Presentation, you have options to transform simple line output to advanced, full-page documents. You can:

- Add front and back electronic forms, or overlays, to your application output.
- Print your output in 2-up, 3-up, and 4-up page formats.
- Reduce the output so that, for example, it can be printed on 8-1/2 by 11 inch paper.
- Use the line data, page definition, and form definition parameters to completely transform the application output. “Chapter 13. Using Page Definitions and Form Definitions” on page 193 describes how to build page and form definitions using these parameters.

Advance Function Presentation also allows you to specify three types of stapling operations: corner staple (CORNERSTPL), edge stitch (EDGESTITCH), and saddle stitch (SADLSTITCH). These operations are also called finishing operations. Documentation with your printer explains which of these stapling operations are supported. Additionally, the printer documentation explains the degree of variability available for each type of stapling operation supported.

“Appendix H. Printer File Parameters” on page 339 provides a brief description of most of the printer file parameters, grouped generally by those that affect the entire spooled file, those that affect print lines, and those that operate on a full printed page.

Within the printing process, not all of the printer file parameters can be used both before and after print spooling. Table 2 on page 118 lists each parameter and when it can be modified, as well as which parameters require the AFP print manager, PSF/400.

Note: In the following table, symbol meanings are as follows:

▪	Must be AFPDS
▪▪	Not an option if AFPDS



Can be used with the specified command or environment

Table 2. Printer File Parameters

PSF/400 Required	Printer and Spooled File Options	CRTPRTF	CHGPRTF	OVRPRTF	CHGSPFLA
	FILE	●	●	●	●
	JOB				●
	SPLNBR				●
	SELECT				●
	TOFILE			●	
	SRCFILE	●			
	OPTION	●			
	GENLVL	●			
	FLAG	●			
	DEV	●	●	●	●
	PRTSEQ				●
	DEVTYPE	●	●	●	
	PAGESIZE Row/Col or Units	●	●	●	
	LPI 3, 4, 6, 8, 9, or 12	●	●	●	
	CPI	●	●	●	
	OVRFLW	●	●	●	
	FOLD	●	●	●	
	RPLUNPRT	●	●	●	
	ALIGN	●	●	●	●
	CTLCHAR	●	●	●	
	CHLVAL	●	●	●	
	PRTQLTY	●	●	●	..
	FORMFEED	●	●	●	..
	DRAWER	●	●	●	
	FONT	●	●	●	
	CHRID	●	●	●	
	PAGRTT	●	●	●	
	MULTIUP	●	●	●	..
	PRTTXT	●	●	●	
	JUSTIFY	●	●	●	
	DUPLEX	●	●	●	..
	UOM	●	●	●	
●	FRONTOVL - overlay-name offset-down offset-across	●	●	●	..
●	BACKOVL - overlay-name offset-down offset-across	●	●	●	..
●	CONSTANTBACK	●	●	●	..
	REDUCE	●	●	●	..

Table 2. Printer File Parameters (continued)

PSF/400 Required	Printer and Spooled File Options	CRTPRTF	CHGPRTF	OVRPRTF	CHGSPFLA
●	OUTBIN	●	●	●	..
	DECFMT	●	●	●	..
●	FNTRSL	●	●	●	●
●	IPDSPASTHR	●	●	●	●
●	USRRSCLIBL	●	●	●	..
	DFRWRT	●	●	●	
	SPOOL	●	●	●	
	OUTQ	●	●	●	●
	FORMTYPE	●	●	●	●
	COPIES	●	●	●	●
	PAGERANGE	●	●	●	●
	RESTART				●
	MAXRCDS	●	●	●	
	FILESEP	●	●	●	●
	SCHEDULE	●	●	●	●
	HOLD	●	●	●	
	SAVE	●	●	●	●
	OUTPTY	●	●	●	●
	USRDTA	●	●	●	●
	SPLFOWN			●	
	USRDFNOPT	●	●	●	●
	USRDFNDTA	●	●	●	
	IGC ... DTA, CHR, CHRRTT, CPI ...	●	●	●	
	WAITFILE	●	●	●	
	SHARE	●	●	●	
	LVLCHK	●	●	●	
	SECURE			●	
	AUT	●	●		
	REPLACE	●	●		
	TEXT	●	●		
	FIDELITY	●	●	●	●
	VOL - diskette output				●
	LABEL - diskette output				●
	EXCHTYPE - diskette output				●
	CODE - diskette output				●
●	FRONTMGN - front margin offset-down offset-across	▪	▪	▪	
●	BACKMGN - front margin offset-down offset-across	▪	▪	▪	

Table 2. Printer File Parameters (continued)

PSF/400 Required	Printer and Spooled File Options	CRTPRTF	CHGPRTF	OVRPRTF	CHGSPFLA
●	FNTCHRSET - character set and code page	▪	▪	▪	
●	CDEFNT	▪	▪	▪	
●	TBLREFCHR	▪	▪	▪	
●	PAGDFN	▪	▪	▪	●
●	FORMDF	▪	▪	▪	●
●	AFPCHARS	▪	▪	▪	
●	IGCCDEFNT	▪	▪	▪	
●	CORNERSTPL	●	●	●	..
●	EDGESTITCH	●	●	●	..
●	SADLSTITCH	●	●	●	..

Super Sun Seeds Case Study

One of the simplest ways to take advantage of Advanced Function Presentation is to add electronic forms to an application with the printer file. This technique instantly transforms a preprinted form application into a completely electronic application. Using printer file overlays does not provide you with as many functions as those done with DDS or with page and form definitions, but for many output applications, this method will be adequate. Figure 7 on page 30 shows the Super Sun Seeds sample case study invoice application.

The existing application program, whether data fields are program-described or externally-described, only places lines of output in the spooled file. The document is completed by printing those lines on a fixed, preprinted form.

An electronic version of the invoice form can be created by modifying the printer file overlay and positioning parameters with the create (CRTPRTF), change (CHGPRTF), or override (OVRPRTF) commands. The key parameters are as follows:

Unit of Measure	_____	*INCH, *CM
Front side overlay (FRONTVL)		
Overlay	*NONE	Name, *NONE
Library	*LIBL	Name, *LIBL
Offset down	_____	0-57.790
Offset across	_____	0-57.790
Back side overlay (BACKVL)		
Overlay	*FRONTVL	Name, *NONE
Library	*LIBL	Name, *LIBL
Offset down	_____	0-57.790
Offset across	_____	0-57.790
Front side margin (FRONTMGN)		
Offset down	_____	0-57.790, *DEV
Offset across	_____	0-57.790, *DEV
Back side margin (BACKMGN)		
Offset down	_____	0-57.790, *FRONTMGN
Offset across	_____	0-57.790, *FRONTMGN
Printer device type	_____	*SCS, *AFPDS

Usually, you specify the overlay object name for the front overlay parameter and use 0 for the offsets. If the new invoice overlay and the invoice data do not line up, you can use the overlay offsets and margins to fine-tune the positioning. Note that in this case the margin parameters move all page elements, including both the application data and the overlay. It is usually best, therefore, to use the overlay offset to correctly position the electronic form with respect to the data. Any offsets you use, overlay or margin, work in the units (inches or centimeters) defined by the UOM parameter. Since overlays are AFPDS objects, the printer file DEVD parameter must also be changed to *AFPDS.

Additional Considerations

Using printer file overlay support to transform the Super Sun Seeds sample application is simple, easy, and quick. And it requires no change to the application program. In fact, you can make this change after the application has already run and created the spooled file. You use the Change Spooled File Attributes (CHGSPLFA) command and the same parameters described earlier.

There are some limitations to this approach, specifically as they relate to a preprinted invoicing application. Your application may require some or all of the following functions:

- Duplexed documents
- Multiple copies
- Multiple overlays, either per page or over groups of pages
- Image, graphic, or bar code support
- Integrated application logic

The first two functions are often built into preprinted forms. The continuous form has multiple copies, and may have some fixed text on the back side on one or all of the copies. With printer file overlay support, you can create the multiple copies by printing the spooled file multiple times and overriding it each time with a different overlay name; that is, by specifying invoice overlays that differ only in that they say "Customer Copy", "Packing List", and so forth at the bottom of the form.

This process can be easily automated within a CL program. Using this technique, you would produce uncollated copies of the invoices, which means that all the customer copies are in one stack, all the packing lists are in another, and so on. This may or may not be the way the workflow occurs in your invoicing function. If one or more of the copies needs to be grouped together; that is, collated, then one of the other application enabling techniques covered in the following chapters may be more appropriate.

Placing constant text on the back side of the invoice can be done with back overlay support, but requires a minor application change. Constant text usually consists of terms and condition type information. If you have specified a DUPLEX parameter of *YES and you have entered both front and back overlays, then the invoice data will print on both sides. This means that the back side prints with the right overlay and with unwanted application data. The cause of the problem is that there is no page eject to move that page of invoice data to the front of the next page. A simple change to the application program would add a page eject after each page of invoice data is printed.

Other document elements, such as multiple overlays, image, graphics, bar codes, and program integration, only can be specified with the more advanced printing

techniques covered in subsequent chapters. These elements all require you to take some action based on the content of the program data. For example, you may want to use a different overlay based on the company number in the invoice data, or you may want to print a specific output field in bar code, or you may want to print an image based on customer information. These functions are beyond the scope of the overlay support in the printer file.

Other Examples of Using Electronic Forms

Many different kinds of output can be enhanced by the use of electronic forms.

Figure 58 shows a “greenbar” overlay that can be used to improve the look and readability of a standard report. This kind of overlay is easy to create and is easily added using the front and back overlay parameters.

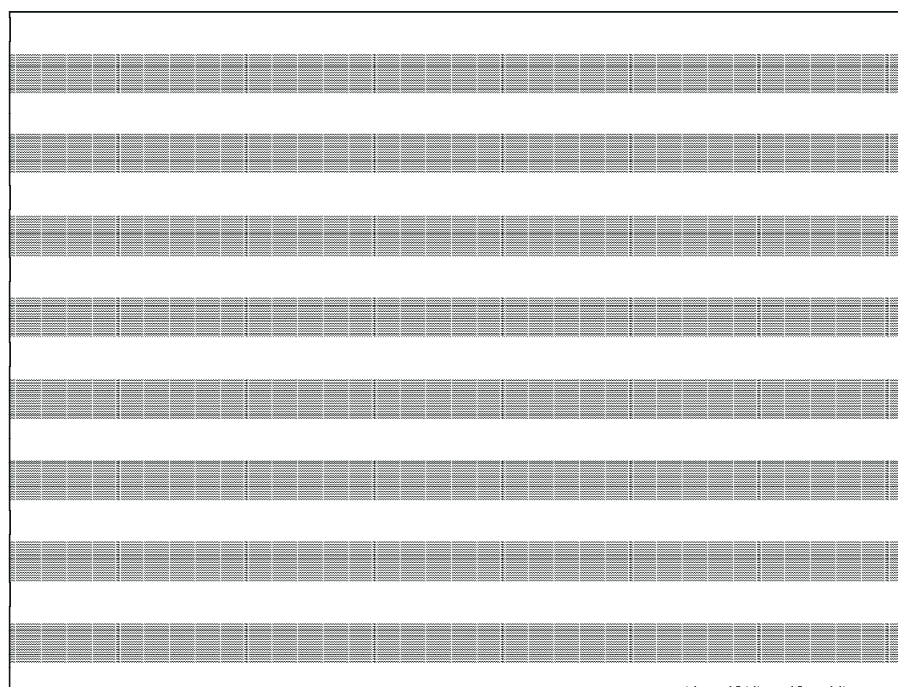


Figure 58. Greenbar Overlay

Additional Applications of Printer File Support

Several other parameters in the printer file also can enhance your current application output. These include parameters used to specify computer output reduction, multi-up support, drawer and bin support, and line font and spacing.

Computer Output Reduction

Computer output reduction (COR) automatically takes standard reports on computer paper and reduces them to fit on 8-1/2 by 11 inch paper. COR is designed to handle reports created at 66 lines per page and 132 print positions per line.

Figure 59 for an example of the COR function.

***** 3/12/96		SUPER SUN SEEDS			CUSTOMER LIST				
CUST#	CUSTOMER NAME	CL	X	C SALESMAN	DTBCST	SALBS YTD	LASTSAL	CONTACT	PHONE NUM
000100	IMPROVED PRINTING CORP	RZ	Y	X TOUR PRINTER RHP	060352	3,182.00	093052	IBM PRINTER PROSPECT	37644912
000101	SUPER SEEDS	RZ	Y	X BURT SEED	011052	1,193.50	092859	STARK SUPERSEEDS	12356700
000102	PLEASANT PLANTS	IO	Y	X JOHNNY JONES	030959	923.70	091663	MARGE FIELD	98757629
000103	PETER'S PLANTS	OJ	Y	X CHRIS SEEDER	030455	23.96	092057	PETER GREENTHUMB	45898099
000104	TREE AND SHRUB EMPORIUM	IO	Y	X PATRICIA PRACH	030354	589.36	081955	WILLIAM ACRES	48484710
000105	VERN'S PERNS	RJ	Y	X MICHAEL HLMWOOD	121254	26.06	091257	VERNON ARBOL	12341234
000106	POLLY'S PLANTS	RZ	Y	X DANIEL MATHRELLY	023058	10,890.00	042361	POLLY ASPENTREE	54432120
000107	BEN'S EXOTIC SEED SUPPLY	RZ	Y	X VICTOR PLANTA	052054	108.73	101856	BENJAMIN S. HEDLING	23845690
000108	RZ GROWTH NURSERY	RZ	Y	X MICHAEL GOODACRE	040854	630.92	101256	HARVEST TREEMASTER	23900112
000109	TREE'S ARE US	PG	Y	X MARY PINETREE	070960	93.30	112161	SHERMAN OAKTREE	23943901
000110	SOUTHERN SEED SUPPLY	IQ	Y	X SUNNY SMITH	031059	492.90	120362	JOHN R. APPLESEED	23099100
000111	MIRACLE GROWTH PLANTS	IO	Y	X PATRICIA PRACH	080762	146.36	090963	MADALINE ASPENGROVE	43364235
000112	SARAH'S SAPARI FRUITS	OJ	Y	X MICHAEL HLMWOOD	123069	860.45	010171	SARAH ORANGEMAN	23432407
000113	RODY'S RAYSHING RADISHES	RJ	Y	X CHRIS SEEDER	093067	13.30	031569	RODY R. RAYSHING	12437232
000114	TRULY TASTY TURNIPS	PG	Y	X MARY PINETREE	050384	129.57	120486	THEODORE TRULY	97894387
000115	MEGA GROWTH SQUASH	IO	Y	X MICHAEL GOODACRE	121577	1,284.51	052178	MARYANNE PESCUE	08923489
000116	PEDRO'S PLEASANT PLANTS	IO	Y	X JOHNNY JONES	121483	126.92	061286	PEDRO MARTINEZ	00761233
000117	FRANK'S FRISH FRUITS	PG	Y	X PATRICIA PRACH	111567	263.86	031271	FRANKLIN APPLEBY	12514237
000118	SUPERIOR SEEDS AND SUPPLY	DJ	N	X BURT SEED	041252	238,856.54	051253	SAMMY SUPERIOR	14232199
000119	MARTHA'S MERRY MANGO'S	IO	N	X SUNNY SMITH	071254	550.59	052556	MARTHA SHROEDER	53875639
000120	MARVELOUS MAPLE TREES	PG	N	X MICHAEL HLMWOOD	121282	4,026.12	090992	MARVIN SYRUP	12341724
000121	WILMA'S WILD SEED SUPPLY	RZ	N	X DANIEL MATHRELLY	043256	6.65	012078	WILMA BRUSSELSPROUT	49038670
000122	THEODORE'S TREE HAVEN	OJ	N	X VICTOR PLANTA	102957	635.63	120462	THEODORE BIGOAK	12431274
000123	PENNY LANE PLANTS & SEEDS	IQ	N	X CHRIS SEEDER	010188	282.12	012188	ROSAMARY TULIP	81236547
000124	HEALTHY HABITATS	RZ	N	X MICHAEL GOODACRE	042387	610.13	123190	JP GOODBODY	51098234
000125	FRAN'S FAMOUS FOLIAGE	RZ	N	X SUNNY SMITH	041376	239.99	041376	FRANCIS McDONALD	87132513
000126	MERLIN'S MAGIC SEEDS	PG	N	X JOHNNY JONES	102961	4,664.13	012366	MERLIN MCGRATH	09578094
000127	ANNA'S APPLETREES	IO	N	X MARY PINETREE	091355	78,097.89	091384	ANNA BANANA	12396787
000128	BART BARK NURSERY	RZ	N	X BURT SEED	123070	56.22	012678	BART BARK	09482734
000129	JAMES JAMAICAN JUNIPERS	OJ	N	X PATRICIA PRACH	012874	9,257.25	044376	JAMES GOODFRIEND	45623849
000130	PISTOL PETE'S PINES	IQ	Y	X MICHAEL HLMWOOD	012355	12.32	012756	PETER PINCONR	84318029
000131	WASHINGTON WATHEMHLONG	DJ	Y	X MARY PINETREE	092979	1,480.63	092383	GHOPE WASHINGTON	63467034
000132	MIDWESTERN SEED SUPPLY	IO	N	X SUNNY SMITH	072368	502.71	102392	JULIAN SEEDLING	45906734
000133	BREADBASKET SEED EMPORIUM	IQ	Y	X JOHNNY JONES	012154	113.94	091272	KATHERINE MIBATHIN	64845456
000134	JOLLY GIANT VEGGIES	IQ	N	X DANIEL MATHRELLY	061260	31,803.70	022367	GROKOR GREENBYRD	35673567
000135	ASPARAGUS TO ZUCCHINI	OJ	N	X VICTOR PLANTA	011769	114.90	031880	RUTHANNE GOODOATS	70897809
000136	ORGANIC GARDEN SUPPLIES	RZ	Y	X CHRIS SEEDER	012342	20,532.21	051757	ARNOLD GOODSEED	00709679
000137	FRESH FRUIT SUPPLIES	PG	Y	X MICHAEL HLMWOOD	041277	42.04	081283	FRANKLIN LILY	37468945
000138	ABUNDANT FRUIT & FLOWERS	IO	Y	X BURT SEED	101352	142.86	091653	NANCY LOTUS	73904673
000139	GOOD SEED POTATOS	IO	N	X MARY PINETREE	010783	1,190.41	032387	RICHARD POTATOHREAD	23842398
000140	GREEN MOUNTAIN FLOWER	IQ	N	X SUNNY SMITH	042759	20,377.99	052361	EARL BARNHAUSHER	90438275
000141	LOS ARBOLES DEL MUNDO	PG	Y	X MICHAEL GOODACRE	121252	2.72	072169	ARMANDO RAMIREZ	89099678
000142	PLANTAS ROJO & VERDE	RZ	N	X JOHNNY JONES	103184	5,599.72	123391	ROSARITA BONITA	47529803
000143	JUMPING BEANS LIMITED	OJ	N	X VICTOR PLANTA	030353	4.98	030353	LAWRENCE HIGHJUMPER	34710293
000144	LOS ARBOLES GRANDS	IO	Y	X PATRICIA PRACH	060656	20.44	060656	LORRENZO JUAN	00808080
000145	STEPHEN'S SEED SHOP	PG	N	X MICHAEL HLMWOOD	092390	10,581.70	092292	STEPHEN PRADODY	88086723
000146	GARDENER'S MARKET	IO	N	X PATRICIA PRACH	090872	95.56	041274	JEFFERY GARDNER	90908045
000147	REDWOOD RANCH & SEED	IQ	Y	X MARY PINETREE	010059	120.00	060662	TAMARA FORSTER	46464646
000148	CLASSIC GARDEN SUPPLIES	IO	Y	X CHRIS SEEDER	040467	819.20	062970	MARIA RANCHER	01234567

Figure 59. Example of COR Function

The COR function works as follows:

- The new page is in landscape format
- Page margins are set at .5 inch
- Line height is 70% of original
- Printer-resident fonts are substituted to achieve the right line width reduction, as follows:
 - 10 CPI is converted to a 13.3 pitch font
 - 12 CPI is converted to a 15 pitch font
 - 15 CPI is converted to a 20 pitch font
 - 16.67 CPI is converted to a 27 pitch font

Multi-Up Printing

Printing multiple logical pages on a single physical page offers significant advantages in cost and volume of printed reports. Combining this function with duplex printers doubles its value.

The use of 4-up printing may push the limits of readability, but it may be the right solution for certain high-volume reports. Adding an overlay also can improve the look and readability of the report.

Multi-Up support works with the LPI, CPI, PAGRTT, and PAGSIZ parameters of the spooled file and uses the most appropriate printer-resident fonts to fit the logical pages onto an 8-1/2 by 11 inch page with 1/2-inch margins.

Many printers now support oversize paper stock such as 11 by 17 inch paper. You can print two full size pages on 11 by 17 inch paper by specifying MULTIUP as 2 and REDUCE as *NO, and by also using the DRAWER parameter to select the right paper.

Figure 60 shows an example of multi-up printing.

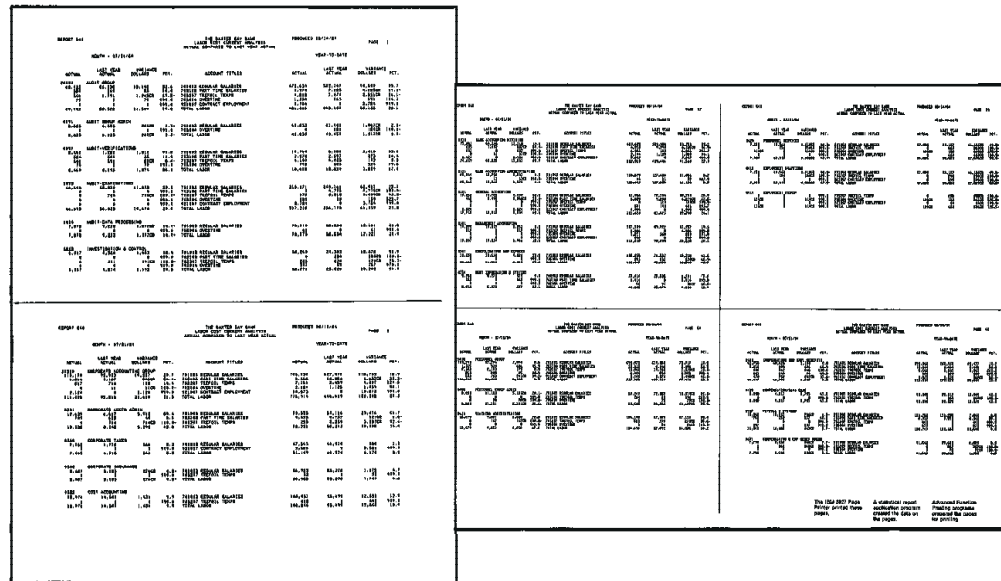


Figure 60. Multi-Up Printing: Example of 4-up and 2-up Printing

Cut-Sheet Emulation

PSF/400 Version 4 Revision 2 provides software support for users to request side-by-side printing on either a simplex or duplex continuous forms printer that supports cut-sheet emulation. This can be done without changing the application or any resource used to print. The side-by-side printing is chosen at the printer itself. The output, when slit and collated by post-processing equipment, looks like output generated by a cut-sheet printer.

You can configure PSF so that side-by-side printing will be generated only if the size of the page will allow it. If you select ALL or FIRST for automatic page size checking, PSF checks to see if all pages (ALL) or the first page (FIRST) will fit side by side before the printer starts printing. If the pages do not fit side by side, then they will be printed one per side. If pages do fit side by side, then the printer will print side by side (cut-sheet emulation). Of course, if you have selected FIDELITY (*ABSOLUTE), cut-sheet emulation printing will not proceed unless all pages fit side by side. If you choose cut-sheet emulation at the printer and select NONE for automatic page size checking, and have selected FIDELITY (*CONTENT), pages will be printed side by side regardless of whether or not two pages fit on the page.

Line and Font Changes

You can modify the appearance and spacing of application output by using the line, character, and font parameters in the printer file. Different combinations of the LPI and CPI parameters enable you to change the line and character spacing. You can modify the default font used for spooled file output in the following ways: by

specifying a printer-resident font using the FONT parameter; by specifying an AS/400-resident font in two ways, either by using the coded font (CDEFNT) or by using the font character set (FNTCHRSET). The coded font maps to a specific code page and character set. With FNTCHRSET, you specify the code page and character set explicitly.

Finishing Operations

Finishing operations are operations performed on a document as it is being printed and after it is being printed. On printers that provide finishing support, the Z-fold and Insert operations occur as the document is printed, and the three types of stapling operations (corner staple (CORNERSTPL), edge stitch (EDGESTITCH), and saddle stitch (SADLSTITCH)) occur after a document has been printed. By having the printer perform stapling operations, you can eliminate the manual job of stapling. Be sure to check your printer's manuals for information about which finishing operations are performed and the level of support provided for each finishing operation. Note that neither job nor file separators are stapled to their respective documents.

Printing with AS/400

Availability of PSF/400 Programming Support for Finishing: Support for finishing operations has been released as PTFs to earlier releases of OS/400. The method for specifying a finishing operation can vary on different releases. For specific information, see the special instructions in the PTF cover letter for each release as follows:

V4R4	No PTFs required
V4R3	SF51377, SF51409
V4R2	SF51220, SF51245
V4R1	SF51791, SF51799
V3R7	SF51984, SF52057
V3R2	SF52649, SF52682

Legend for Finishing Tables:

- Yes** An operation is supported by the indicated method. For additional information on Form Definitions created by PPFA/400, see the product's manual for information about specifying the particular finishing operation.
- No** An operation is not supported by the indicated method.

Under Printer File and DDS

Use the parameter or keyword as shown.

Migration Considerations for Finishing Tables:

- V4R4 and V4R3 support printer file-specified stapling operations from previous RISC releases. If you want to continue using printer files that use USRDFNDDTA to specify a stapling operation, the new corresponding parameter in V4R3 or V4R4 must have a value of *None. The default for CORNERSTPL, EDGESTITCH, and SADLSTITCH is *None.
- The method by which stapling operations are specified on V3R2 cannot be migrated to any other release.

Table 3 and Table 4 show where you can specify a finishing operation according to the release you are using.

Table 3. AS/400 Finishing Support for Releases V4R4 and V4R3

Operation	Release V4R4			Release V4R3		
	Form Def	Printer File	DDS	Form Def	Printer File	DDS
Corner Staple	Yes	CORNERSTPL	No	Yes	CORNERSTPL	No
Edge Stitch	Yes	EDGESTITCH	No	Yes	EDGESTITCH	No
Saddle Stitch	Yes	SADLSTITCH	No	Yes	USRDFNDDTA	No
Z-Fold	Yes	No	ZFOLD	Yes	No	No
Insert	Yes	DRAWER	DRAWER	Yes	DRAWER	DRAWER

Table 4. AS/400 Finishing Support for Releases V4R2, V4R1, V3R7, and V3R2

Operation	Releases V4R2, V4R1, and V3R7			Release V3R2			
	Form Def	Printer File	DDS	Form Def	Printer File	DDS	Data Area
Corner Staple	Yes	USRDFNDDTA	No	Yes	USRDTA	No	Yes
Edge-Stitch	Yes	USRDFNDDTA	No	Yes	USRDTA	No	Yes
Saddle Stitch	Yes	USRDFNDDTA	No	Yes	USRDTA	No	Yes
Z-Fold	Yes	No	No	Yes	No	No	No
Insert	Yes	DRAWER	DRAWER	Yes	DRAWER	DRAWER	No

Chapter 11. Using Data Description Specifications

Using Data Description Specifications (DDS), which is included in OS/400, for application output enables you to take full advantage of the advanced printing capabilities of AS/400 in much the same way as using external database files enables access to the advanced database capabilities of the system. DDS printer file support provides full control of output, and supports the advanced electronic printing capabilities of today's laser printers. DDS gives you complete control over each page and over all the elements that come together on a page.

DDS support for advanced electronic business documents builds on existing support for line-mode output. DDS supports standard document composition elements, such as electronic forms, images, graphics, bar codes, lines, and boxes. Direct control is provided, for example, over what electronic forms or images go on to what pages. Support for full control of document pages and page layout from the application program also is provided. In addition, nearly all DDS support is dynamic; that is, the application controls both the element and its positioning, enabling you to produce documents with "floating" page elements.

As described in "Chapter 10. Using Printer Files" on page 115, every AS/400 job has a printer file that provides page defaults such as margins, line spacing, and overflow.

The printer file also provides printer and queue options such as printer device, file type, and spooled file save. It provides page composition, such as front and back overlays and page and form definitions. Generally, these parameters apply to the entire job or spooled file.

Printer File DDS

DDS printer file support externalizes application output and extends it to full-page applications. Output that is defined within the program is called "program-described" output. Output that is defined with DDS is called "externally-described" output.

Figure 61 on page 128 shows an example of how DDS is used within the printer file to define application output. The program builds the data fields to be printed and does a write to a DDS record format. The data fields are referenced within the record format. The printer file, through the DDS keywords, controls the position, orientation, font, and other characteristics for those fields. In addition, DDS provides access to all the elements—text, overlays, images, graphics, bar coding, lines, and boxes—that comprise AFP documents.

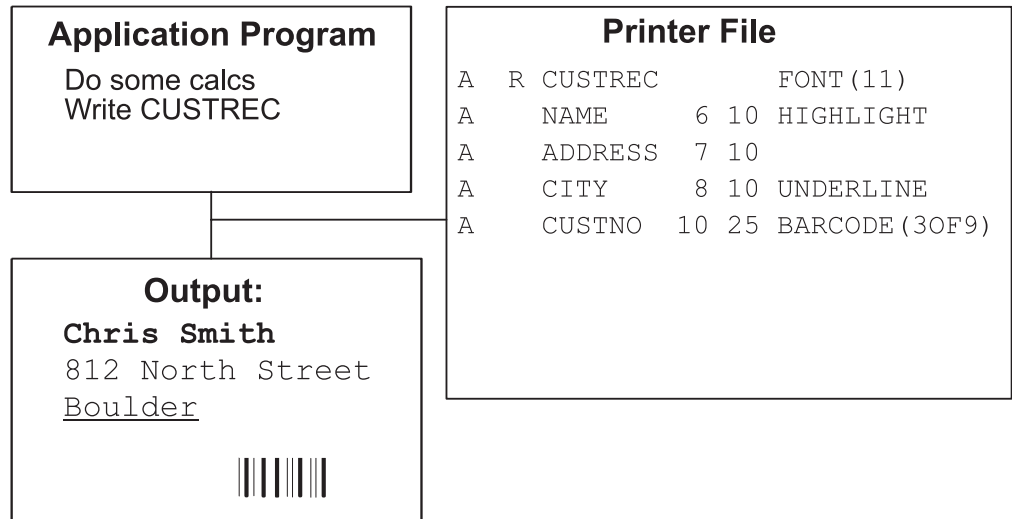


Figure 61. Externally Described Printer File with DDS

Figure 61 shows a simple example of how DDS print formatting works. The application program prepares the variable data. It also establishes the logic of printing, or in this case, the "writes" to DDS records. A DDS print record is the collection of fields and/or print keywords that are to be executed when the application program issues the write command. Once the record write and variable data is passed to DDS, DDS can control font, positioning, and other characteristics external to the application program.

DDS groups one or more individual fields together to create a record. The application program controls printed output by deciding when to write which records.

Some DDS keywords apply only to the entire record (record-level). Other DDS keywords apply only to fields (field-level). Some DDS keywords can be used at either record-level or field-level.

Keywords for AFP Applications

The keywords described in the following sections are used to enable applications using full page mode. Keywords for page layout and for page composition are described.

Page Layout Keywords

The following sections describe keywords used for page layout.

LPI

LPI is a record-level keyword used to change lines per inch. When the LPI keyword is specified, it overrides the LPI parameter of the printer file.

The format of the LPI keyword is:

LPI (4 6 8 9 12)

ENDPAGE

ENDPAGE is a record-level keyword that specifies the ejection of the current page after the current output record is printed.

The format of the ENDPAGE keyword is:

ENDPAGE

If you are positioning fields, constants, page segments, and other page elements with down and across positions, you can specify positions anywhere on the page. In this case, the typical line-mode trigger for a page eject, the overflow line, may not be reached. ENDPAGE enables explicit control of page ejection.

PAGRTT

PAGRTT is a record-level keyword that specifies the degree of rotation, or orientation, of the constants and text that is printed. It overrides the PAGRTT parameter value in the printer file.

The format of the PAGRTT keyword is:

PAGRTT (0 90 180 270)

Page rotation does not automatically affect other page elements, such as overlays and page segments. The page rotations are also known as across (0), down (90), back (180), and up (270).

DRAWER

DRAWER is a record-level keyword that specifies the drawer from which noncontinuous forms are selected.

The format of the DRAWER keyword is:

DRAWER (drawer-number)

Valid values are 1-255 and *E1 (for envelope feeder). If the DRAWER keyword is not specified, the DRAWER parameter in the printer file is used.

Refer to *AS/400 Data Description Specifications Reference* for more information on the keywords described in this section.

FORCE

FORCE is a record-level keyword used to force a new sheet of paper for duplex printing. If currently printing on the front side of the sheet, the current sheet is ejected, and a new sheet is fed in.

The format of the FORCE keyword is:

FORCE

OUTBIN

OUTBIN is a record-level keyword that specifies the destination bin of the output on printers that support multiple output bins.

The format of the OUTBIN keyword is:

OUTBIN(output-bin number)

Valid values are 1-65535 and *DEV.D. If the OUTBIN keyword is not specified, the OUTBIN parameter in the printer file is used.

DUPLEX

DUPLEX is a record-level keyword that specifies whether output is printed on one or on two sides of the paper.

The format of the DUPLEX keyword is:

DUPLEX(duplex-value)

Valid values are *NO, *YES, and *TUMBLE. If the DUPLEX keyword is not specified, the DUPLEX parameter in the printer file is used.

Page Composition Keywords

The following sections describe keywords used for page composition.

Most of the keywords enable program-to-system fields that are used to dynamically change the values of the keyword parameters while the application program is processing.

BARCODE

BARCODE is a field-level keyword that prints a field in a user-specified bar code. The supported bar codes are:

Bar Code	Bar Code ID
MSI	MSI
UPC-A	UPC-A
UPC-E	UPC-E
UPC-2	UPC-2
UPC-5	UPC-5
EAN-8	EAN-8
EAN-13	EAN-13
EAN-2	EAN-2
EAN-5	EAN-5
Industrial 2 of 5	INDUST2OF5
Matrix 2 of 5	MARIX2OF5
Interleaved 2 of 5	INTERL2OF5
Codabar	CODEABAR
Code 3 of 9	CODE3OF9
Postal	POSTNET
Royal Mail	RM4SCC
Japan Postal	JPBC
Australian Postal	AUSTRALIAN POSTAL

The format of the BARCODE keyword is:

BARCODE bar-code-ID height horizontal-vertical human-readable
code3of9-asterisk check-digit unit-width wide/narrow ratio

Where the parameter values are:

Height Values from 1-9 for bar code height, in lines

Horizontal/Vertical

Values are *HRT and *VRT. Default is horizontal.

Human-Readable

Print human-readable interpretation of bar code. Values are *HRI, *HRITOP, and *NOHRI. Default is to print human-readable (*HRI).

Code 3 of 9 Asterisk

Include (*AST) or exclude (*NOAST) for Code 3 of 9 bar code. Default is to exclude asterisk.

Check Digit A hex value is used to indicate if a check digit (or multiple check digits) should be generated.

Unit-width Width (in inches) of narrow bars and spaces.

Wide to narrow ratio

Ratio of wide bars and spaces to narrow bars and spaces.

For most bar codes, you need to specify only the bar code ID and the height.

For more information on bar code characteristics, refer to *AS/400 Data Description Specifications Reference*.

BOX

The BOX keyword prints a box or rectangle.

The format of the BOX keyword is:

BOX (first-corner-down first-corner-across diagonal-corner-down
diagonal-corner-across line-width)

You define a box by specifying the down and across positions of two opposite corners, and by giving the line width. The positions are relative to the page margins (FRONTMGN and BACKMGN parameters of printer file), and are calculated in inches or centimeters according to the UOM parameter of the printer file. The line width of the box can be any value in the range from .001 to 22.750 inches, or can be specified using the special values *NARROW (.008 in.), *MEDIUM (.017 in.), and *WIDE (.025 in.).

All values of the BOX keyword can be program-to-system fields.

GDF

The GDF keyword prints a graphic data file created by a program such as Business Graphic Utility (BGU) or GDDM.

The format of the GDF keyword is:

GDF (library/graph-file graph-member position-down position-across
graph-depth graph-width graph-rotation)

All values of the GDF keyword can be program-to-system fields. This enables graphics, such as bar and pie charts, to be created and printed dynamically.

LINE

The LINE keyword prints a horizontal or vertical line.

The format of the LINE keyword is:

LINE (position-down position-across line-length line-direction
line-width)

Lines are drawn by specifying the down and across starting positions, the horizontal and vertical direction, and the line width and length. Line length can be any value in the range from .001 to 22.750 inches. Line width can be any value in the range from .001 to 22.750 inches, or it can be specified using the special values *NARROW (.008 in.), *MEDIUM (.017 in.), and *WIDE (.025 in.).

All values of the LINE keyword can be program-to-system fields.

OVERLAY

The OVERLAY keyword prints an electronic form or overlay.

The format of the OVERLAY keyword is:

OVERLAY (library/overlay-name position-down position-across
(*ROTATION rotation))

The down and across position marks the top left point of the overlay, relative to the page origin, and is offset by the page margins (the FRONTMGN and BACKMGN parameters of the printer file). The optional *ROTATION parameter allows you to specify a rotation value for the overlay.

Valid values for *rotation* are: 0, 90, 180, and 270.

All values of the OVERLAY keyword can be program-to-system fields. This enables you to dynamically change both the overlay name and its position on the page.

PAGSEG

The PAGSEG keyword prints a page segment.

The format of the PAGSEG keyword is:

PAGSEG (library/page-segment position-down position-across
(*SIZE width height) (*ROTATION rotation))

The down and across position marks the top left point of the page segment. This point is offset by the page margins, (the FRONTMGN and BACKMGN parameters of the printer file). The optional *SIZE and *ROTATION parameters allow you to specify a different size and rotation for the page segment.

Valid values for *SIZE are: 0.001 to 57.590 cm (0.0001 to 22.750 in.) for both width and height. Valid values for *ROTATION are: 0, 90, 180, and 270.

All values of the PAGSEG keyword can be program-to-system fields.

POSITION

POSITION is a field-level keyword used to define the exact position of a field.

The format of the POSITION keyword is:

POSITION (position-down position-across)

The down and across position is offset from the page origin by the page margins, (the FRONTMGN and BACKMGN parameters of the printer file). The UOM parameter of the printer file determines whether the down and across values are in inches or centimeters.

Both values of the POSITION keyword can be program-to-system fields.

CDEFNT

CDEFNT is a record or field-level keyword that specifies the coded font for printing constants or fields. A coded font specifies an AS/400-resident font by pointing to a specific font character set and code page. For example, the coded font X0H210BC uses the font character set C0H200B0 and code page T1V10500 to print 10-point Helvetica Roman Medium. Point size can be specified for outline fonts.

The format of the CDEFNT keyword is:

CDEFNT (library name/coded-font-name point-size)

FONT

FONT is a record- or field-level keyword that specifies the font ID used for printing constants or fields.

The format of the FONT keyword is:

FONT (font-identifier point-size)

You can specify numeric font identifiers: Font Global ID or FGID, for example; or graphic fonts, such as ADMWMOB for Open Block characters. Refer to *AS/400 Printer Device Programming* for more information on numeric font IDs and their use.

FNTCHRSET

FNTCHRSET is a record- or field-level keyword that specifies the font character set used for printing constants or fields. Point size can be specified for outline fonts.

The format of the FNTCHRSET keyword is:

FNTCHRSET (library-name/font-character-set library-name code-page point-size)

CHRSIZ

The CHRSIZ keyword is used to expand the width and height of a constant or field.

The format of the CHRSIZ keyword is:

CHRSIZ(width height)

Values for CHRSIZ can be in the range from 1.0 to 20.0. CHRSIZ uses the width of the current font and the current CPI setting to calculate the expanded width. CHRSIZ uses the current lines per inch (LPI) value to calculate expanded height.

COLOR

The COLOR keyword specifies the color for a field. Color is used by printers that support color, such as the 4224 printer, and by the output Viewer in Client Access/400.

The format of the COLOR keyword is:

COLOR (BLK BLU BRN GRN PNK RED TRQ YLW)

TXTRTT

TXTRTT is a field-level keyword used to rotate fields.

The format of the TXTRTT keyword is:

TXTRTT (0 90 180 270)

HIGHLIGHT

The HIGHLIGHT keyword prints a field in bold characters. The active font for the field must be a numeric font (FONT keyword) that supports bold printing.

The format of the HIGHLIGHT keyword is:

HIGHLIGHT

UNDERLINE

The UNDERLINE keyword underlines a field.

The format of the UNDERLINE keyword is:

UNDERLINE

A summary of all printer file DDS keywords can be found in “Appendix F. Data Description Specifications (DDS) Reference” on page 329. Refer to *AS/400 Data Description Specifications Reference* for more complete information on the keywords described in this section.

Finishing Operation Keywords

Table 3 on page 126 and Table 4 on page 126 show how PSF/400 programming support for finishing operations relates to various releases.

ZFOLD

The ZFOLD record-level keyword causes the current sheet to be first folded in half inwards (so the front side of the sheet is now inside the fold) along a line parallel to the reference edge. The half of the sheet furthest from the reference edge is again folded in half outwards along a line parallel to the reference edge. For example, when applied to an 11" by 17" sheet with the reference edge along a short side, the result is an 8.5" by 11" fold-out.

The format of the ZFOLD keyword is:

ZFOLD (reference-edge paper-type)

The reference edge indicates the edge to be used as a reference for the first fold. The paper type can be ledger or A3.

Figure 62 on page 135 illustrates Z-folded sheets within an edge-stitched document.

Finisher Output

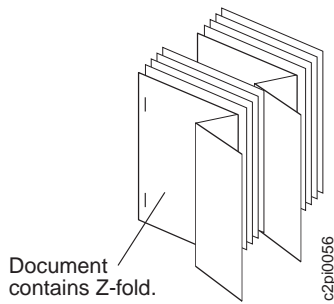


Figure 62. Edge-Stitched Document with Z-Folded Sheets

A summary of all printer file DDS keywords can be found in “Appendix F. Data Description Specifications (DDS) Reference” on page 329. Refer to *AS/400 Data Description Specifications Reference* for more complete information on the keywords described in this section.

DDS Functions

Now that the DDS keywords used to enable full page composition have been introduced, we can show how these keywords are used in a sample case. Figure 63 on page 136 shows how DDS can be used to produce multiple printing function output.

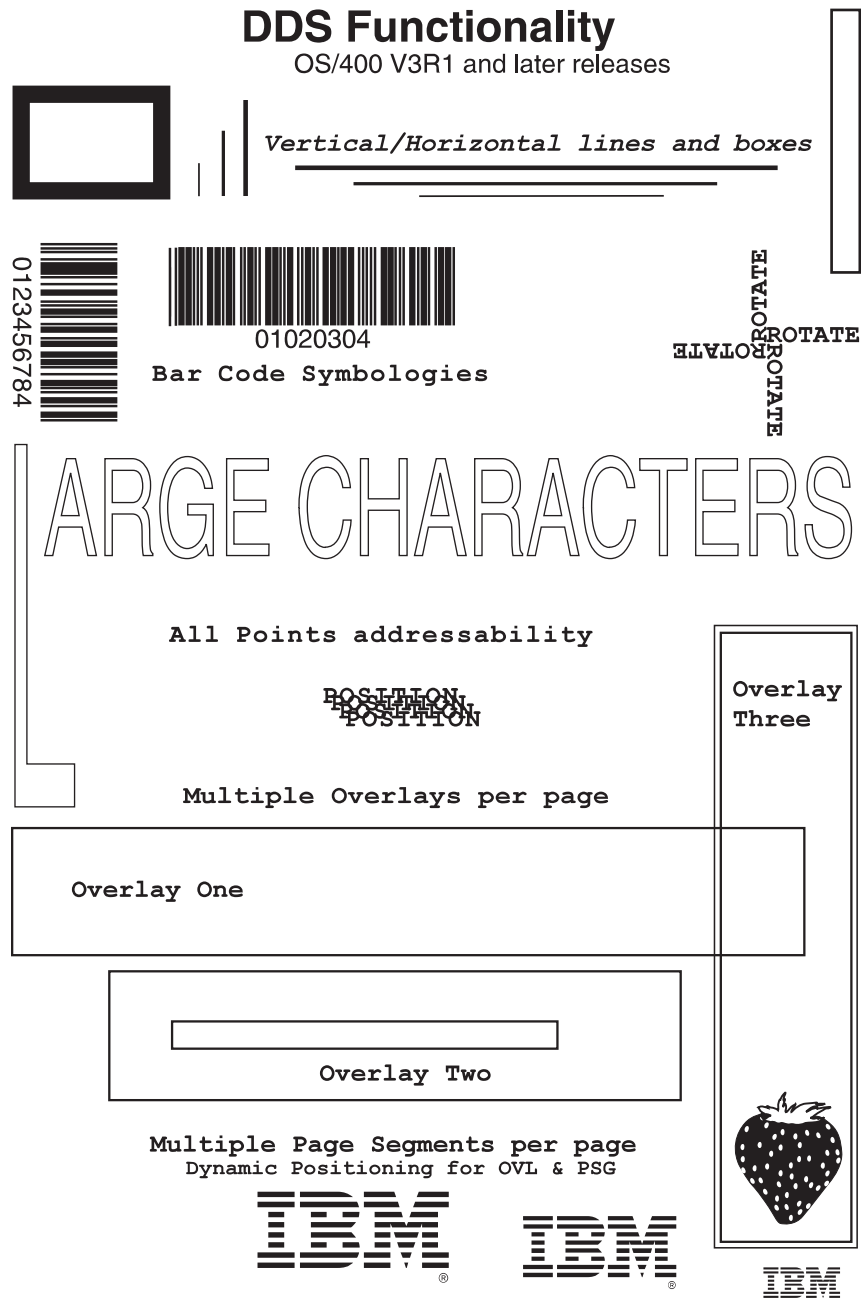


Figure 63. DDS Functionality

DDS Printer Specifications for DDS Functionality Output

The following example shows the DDS printer specifications used to produce the multiple function output example shown in Figure 63.

```

5763PW1 V3R2M0 960917                      SEU SOURCE LISTING
SOURCE FILE . . . . . SAMPLER/QDDSSRC
MEMBER . . . . . DDSFUN
SEQNBR*...+... 1 ...+... 2 ...+... 3 ...+... 4 ...+... 5 ...+... 6 ...+... 7 ..
   100      A* DDSFUN: DDS for Functional DDS Demo
   200      A*

```

```

300      A*      Printer File Parameters:
400      A*
500      A*      CHGPRTF FILE(DDSFUN) DEVICE(XXXXXXX) TYPE(*AFPDS)
600      A*      OVRFLW(64)
700      A*
800      A          R HEADR1
900      A          PAGRTT(0)
1000     A*
1100     A*      'DDS Functionality'
1200     A*      - Helvetica Bold 20-pt
1300     A*      - Down 0.7 Across 3.0
1400     A*
1500     A          LIN01          35A
1600     A          FNTCHRSET(C0H400J0 T1V10037)
1700     A          POSITION(0.7 3.0)
1800     A*
1900     A*      'OS/400 V3R1 and later releases'
2000     A*      - Helvetica Reg 12-pt
2100     A*      - Var Positioning
2200     A*
2300     A          LIN02          35A
2400     A          FNTCHRSET(C0H200B0 T1V10037)
2500     A          POSITION(&LINDWN &LINACR)
2600     A          LINDWN          5S 3P
2700     A          LINACR          5S 3P
2800     A*
2900     A*      LINE Parameters:
3000     A*      - Start Position Down
3100     A*      - Start Position Across
3200     A*      - Length (use UOM in printer file)
3300     A*      - *HRZ or *VRT
3400     A*      - Line Width
3500     A*
3600     A          R LINE1
3700     A          LINE(1.3 2.6 0.2 *VRT *NARROW
3800     A          LINE(1.1 2.8 0.4 *VRT *MEDIUM
3900     A          LINE(0.9 3.0 0.6 *VRT *WIDE)
4000     A          LINE(1.4 3.3 3.2 *HRZ *WIDE)
4100     A          LINE(1.5 3.7 2.4 *HRZ *MEDIUM
4200     A          LINE(1.6 4.1 1.6 *HRZ *NARROW
4300     A*
4400     A*      BOX Parameters
4500     A*      - Start Position Down
4600     A*      - Start Position Across
4700     A*      - Diag Position Down
4800     A*      - Diag Position Across
4900     A*      - Line width
5000     A*
5100     A          R BOX1
5200     A          BOX(0.8 1.0 1.5 2.0 .1)
5300     A          BOX(0.4 7.0 2.1 7.2 .02)
5400     A          R TXT0
5500     A          LIN08          35A    36 27
5600     A          LIN09          35A    50 31
5700     A          51 33 'Dynamic Positioning for OVL
5800     A          FONT(85)
5900     A*      LIN03 'Vertical/Horizontal lines and boxes'
6000     A*      - Font 18 = Courier Italic
6100     A*      LIN04 'Bar Code Symbolologies'
6200     A*      LIN05 'L'
6300     A*      - Font ADMWMOB = Open Block (GDDM)
6400     A*      LIN06 'arge Characters'
6500     A*      - Font ADMWMOB = Open Block (GDDM)
6600     A*      LIN07 'All Points Addressability'
6700     A*      - Font 46 = Courier Bold
6800     A*
6900     A          R TXT1

```

7000	A	LIN03	35A	
7100	A			POSITION(1.3 3.3)
7200	A			FONT(18)
7300	A	LIN04	35A	
7400	A			POSITION(3.1 2.4)
7500	A	LIN05	1A	
7600	A			FONT(ADMWMOB)
7700	A			POSITION(2.9 1.0)
7800	A			CHRSIZ(9.0 20.0)
7900	A	LIN06	15A	
8000	A			POSITION(3.4 1.3)
8100	A			FONT(ADMWMOB)
8200	A			CHRSIZ(6.0 6.0)
8300	A	LIN07	35A	
8400	A			POSITION(4.8 2.0)
8500	A			FONT(46)
8600	A*	Print 'ROTATE' in 4 orientations		
8700	A*			
8800	A	R TXT3		
8900	A	TXT1@1	6	
9000	A			POSITION(2.7 6.4)
9100	A	TXT1@2	6	TXTRTT(90)
9200	A			POSITION(2.7 6.4)
9300	A	TXT1@3	6	TXTRTT(180)
9400	A			POSITION(2.7 6.4)
9500	A	TXT1@4	6	TXTRTT(270)
9600	A			POSITION(2.7 6.4)
9700	A*			
9800	A*	Bar Code Parameters:		
9900	A*	BARCODE (Type, Height, + 6 parameters:		
10000	A*	- Horizontal/Vertical: *HRZ,*VRT		
10100	A*	- Human Readable: *HRI,*HRITOP,*NOHRI		
10200	A*	- Asterisk *AST, *NOAST		
10300	A*	- Check Digit: type		
10400	A*	- Unit Width: narrow bar/space		
10500	A*	- Wide/Narrow Ratio		
10600	A*			
10700	A	R BAR1		
10800	A	BAR1@1	8S	BARCODE(INTERL20F5 3 *VRT)
10900	A			POSITION(2.0 1.8)
11000	A	BAR2@1	8	BARCODE(CODE30F9 3)
11100	A			POSITION(2.0 2.5)
11200	A*			
11300	A*	Print 'POSITION' with different offsets		
11400	A*			
11500	A	R TXT2		
11600	A	TXT2@1	8	POSITION(5.3 3.5)
11700	A	TXT2@2	8	POSITION(5.35 3.55)
11800	A	TXT2@3	8	POSITION(5.4 3.6)
11900	A	TXT2@4	8	POSITION(5.45 3.65)
12000	A	TXT2@5	8	POSITION(5.5 3.7)
12100	A*			
12200	A*	Page Segment IBMLOGOT		
12300	A*	- dynamic name		
12400	A*	- dynamic position		
12500	A*			
12600	A	R PSG1		
12700	A			PAGSEG(&PSGNAM &PSGDWN &PSGAC
12800	A	PSGNAM	8A P	
12900	A	PSGDWN	5S 3P	
13000	A	PSGACR	5S 3P	
13100	A*	Overlays		
13200	A*	- dynamic name		
13300	A*	- dynamic position		
13400	A*			
13500	A	R OVL1		
13600	A			ENDPAGE

```

13700      A                                OVERLAY(*LIBL/DDS0VL1 6.0 1.3
13800      A                                OVERLAY(&OVLNM2 6.9 2.5)
13900      A                                OVERLAY(DDS0VL3 &OV3DWN &OV3A
14000      A                                OVERLAY(DDS0VL3 4.5 6.5)
14100      A      OVLNM2      8A  P
14200      A      OV3DWN      5S 3P
14300      A      OV3ACR      5S 3P
          * * * * E N D   O F   S O U R C E   * * * *

```

The most significant print elements in the DDSFUN printer DDS specifications are:

Text Text, whether constant or field data, is printed in a variety of ways in DDSFUN.

“DDS Functionality”(LIN01)

Printed in a 20-point Helvetica Roman-Bold font, 0.7 inches down and 3.0 inches across the page. The FRONTMGN parameter of the printer file is set to 0, so the down and across positions are measured from the top left edge of the page. Note that the POSITION keyword specifies the baseline or bottom left point of the first character to print.

The font is specified using FNTCHRSET, which defines the character set and code page to use. In the C0H400J0 font character set, **C0** indicates that this is a character set, **H400** is Helvetica Roman-Bold, and **J** is 20-point.

This is a typographic font, part of the AFP Font Collection. For 300-pel printers, C0H400J0 is found in library QFNT300LA1. Code page T1V10037 is the USA and Canada code page, and it is normally located in library QFNTCPL.

“OS/400 V3R1 and Later releases”(LIN02)

Prints in Helvetica Roman-Medium 12-point, 0.9 inches down and 3.3 inches across the page. The FNTCHRSET value is C0H200B0, where **H200** is Helvetica Roman-Medium and **B** is 12-point. Dynamic positioning is used, with program variables LINDWN and LINACR loaded with the down and across values and referenced in the DDS as program-to-system fields.

“Vertical/Horizontal lines and boxes”(LIN03)

Prints in Courier Italic, starting 1.3 inches down and 3.3 inches across the page. The keyword FONT(18) specifies Courier Italic.

“Bar Code Symbolologies”(LIN04)

Prints in Courier 10, which is the default font. In this case it is specified as font identifier 011 in the printer device description.

“L”(LIN05)

L is printed in the Open Block font scaled by the CHRSIZ keyword to 9.0 width and 20.0 height. ADMWMOB is the Open Block font and it is a GDDM scalable font located in the QGDDM library.

“arge Characters”(LIN06)

Also prints in Open Block, but is scaled to 6.0 wide and 6.0 high.

“All points addressability”(LIN07)

Prints in Courier Bold, which is FONT(46).

“Multiple Overlays per page”(LIN08)

Prints in the default font, Courier - FONT(011).

“Multiple Page Segments per page”(LIN09)

Prints in the default font, Courier - FONT(011).

“Dynamic Positioning for OVL and PSG”

Prints in font 85, Prestige Elite.

“Rotate”

Prints the fields TXT1@1 through TXT@4 in the four different rotations: 0, 90, 180, and 270. Each field from TXT@1 through TXT@4 contains the character “ROTATE”. TXTRTT is valid only for fields and not for constants. Note how the POSITION (2.7 inches down and 6.4 inches across the page) defines a baseline starting point for each rotation.

Lines Three vertical and three horizontal lines are printed. The first vertical line begins at a point 1.3 inches down and 2.6 inches across the page, and has a length of 0.2 inches. The line width is *NARROW, 0.008 inches.

All five parameters of the LINE keyword can be program-to-system variables, enabling the application to dynamically draw lines.

Boxes Two boxes are drawn in the DDSFUN example. The first, thicker box is defined by top left (0.8 inch down, 1.0 inch across the page) and bottom right (1.5 inches down, 2.0 inches across the page) positions. The box width is 0.1 inch. Box width also can be specified by the *NARROW, *MEDIUM, and *WIDE special values.

All five parameters of the BOX keyword can be program-to-system variables, enabling the application to dynamically draw boxes.

Page Segments

The page segments explicitly placed on the DDSFUN page are IBM logos. The largest IBM logo is a page segment object (*PAGSEG) called IBMLOGOT, and is positioned 8.7 inches down and 3.6 inches across the page. Unlike text, this position marks the top left point of the page segment image (top left when printed in standard, or 0 rotation).

Note that the strawberry image, a page segment called “STRWNB”, is not explicitly placed by DDS. It is included in Overlay Three.

The three IBM logos are placed using program-to-system variables, enabling the application to dynamically position images.

Overlays

Three very simple overlays are depicted in the DDSFUN example. While the overlays used with the Super Sun Seeds case study are more familiar and realistic, these overlays demonstrate how overlays are used by DDS.

Overlay One is an AS/400 overlay object (*OVL) called DDSOVL1. It is placed 6.0 inches down and 1.3 inches across the page. Again, this is relative to the page margins and marks the top left point of the overlay.

Overlay Two is dynamically referenced from the program by the variable OVLNM2.

Overlay Three is dynamically positioned from the program by the variables OV3DWN and OV3ACR for down and across, respectively.

Bar Coding

Two examples of bar codes are specified.

The field BAR1@1 is printed vertically in the Interleaved 2 of 5 bar code symbology, starting at 2.0 inches down and 1.8 inches across the page.

The bar code is printed with a height of 3, which at 6 LPI prints a 1/2-inch high bar code. Interleaved 2 of 5 is a numeric-only bar code. The human readable field value (012345678) is printed below the bar code, along with the check digit (4).

The field BAR2@1 is printed horizontally in the Code 3 of 9 bar code symbology, starting at 2.0 inches down and 2.5 inches across the page. It prints horizontally because *HRZ is the default. The human readable (01020304) field value is also the default. Note that Code 3 of 9 is an alphanumeric bar code (up to 50 characters), and does not include a check digit.

RPG Programming Specifications for DDS Functionality Output

The following example shows the RPG programming specifications used to produce the multiple function output example shown in Figure 63 on page 136.

```

5763PW1 V3R2M0 960917                      SEU SOURCE LISTING
SOURCE FILE . . . . . SAMPLER/QRPGSRC
MEMBER . . . . . DDSFUN
SEQNBR*...+... 1 ...+... 2 ...+... 3 ...+... 4 ...+... 5 ...+... 6 ...+... 7 ..
100      H
200      H* DDSFUN: DDS Functional Demo
300      H*
400      H* Uses the printer file DDSFUN.
500      H*
600      FDDSFUN  O   E                      PRINTER
700      E                      DTA    1  10  8          Constant Data
800      E                      LIN    1   9 35          Title Lines
900      *
1000     IFIELDS      DS
1100     I                      1 315 LIN
1200     I                      1  35 LIN01
1300     I                      36  70 LIN02
1400     I                      71 105 LIN03
1500     I                      106 140 LIN04
1600     I                      141 141 LIN05
1700     I                      176 190 LIN06
1800     I                      211 245 LIN07
1900     I                      246 280 LIN08
2000     I                      281 315 LIN09
2100     *
2200     C                      MOVE DTA,1    BAR1@1  80      12345678
2300     C                      MOVE DTA,2    BAR2@1   8      01020304
2400     C*
2500     C                      MOVE 'ROTATE'  TXT1@1   6      ROTATE ex.
2600     C                      MOVE TXT1@1   TXT1@2   6
2700     C                      MOVE TXT1@1   TXT1@3   6
2800     C                      MOVE TXT1@1   TXT1@4   6
2900     C*
3000     C                      MOVE DTA,3    TXT2@1   8      POSITION ex.
3100     C                      MOVE DTA,3    TXT2@2   8
3200     C                      MOVE DTA,3    TXT2@3   8
3300     C                      MOVE DTA,3    TXT2@4   8
3400     *
3500     C                      Z-ADD0.9     LINDWN  53      Var Positionin
3600     C                      Z-ADD3.3     LINACR  53
3700     C                      WRITEHEADR1
3800     C                      WRITELINE1
3900     C                      WRITEBOX1
4000     *
4100     C                      WRITETXT0
4200     C                      WRITETXT1
4300     C                      WRITEBAR1
4400     C                      WRITETXT2

```

```

4500      C                      WRITETXT3
4600      *
4700      C                      MOVE 'IBMLOGOT'PSGNAM  8          Var Image (Page
4800      C                      Z-ADD8.7      PSGDWN  53          Var Positioning
4900      C                      Z-ADD3.6      PSGACR  53
5000      C                      WRITEPSG1
5100      *
5200      C                      MOVE 'IBMLOGO 'PSGNAM
5300      C                      Z-ADD8.8      PSGDWN  53
5400      C                      Z-ADD5.3      PSGACR  53
5500      C                      WRITEPSG1
5600      *
5700      C                      MOVE 'IBMSMALL'PSGNAM
5800      C                      Z-ADD9.35     PSGDWN  53
5900      C                      Z-ADD6.8      PSGACR  53
6000      C                      WRITEPSG1
6100      *
6200      C                      MOVE 'DDSOVL2 'OVLNM2  8          Var Overlay
6300      C                      Z-ADD4.4      OV3DWN  53          Var Positioning
6400      C                      Z-ADD6.3      OV3ACR  53
6500      C                      WRITEOVL1
6600      *
6700      C                      SETON                      LR
6800  **   BAR   Bar code data
6900 12345678
7000 01020304
7100 POSITION
7200 **   LIN   LINES DATA
7300 DDS Functionality
7400 OS/400 V3R1 and later releases
7500 Vertical/Horizontal lines and boxes
7600 Bar Code Symbolologies
7700 L
7800 ARGE CHARACTERS
7900 All Points addressability
8000 Multiple Overlays per page
8100 Multiple Page Segments per page
          * * * * E N D   O F   S O U R C E   * * * *

```

Printer File for DDS Functionality Output

The printer file parameters created and used with DDSFUN are shown below.

```

5763SS1 V3R2M0 960917          Display File Description      3/1
File . . . . . : DDSFUN
Library . . . . . : *LIBL
Type of information . . . . . : *ALL
File attributes . . . . . : *PRTF
System . . . . . : *LCL
Processor . . . . . : IBM AS/400 Display File Description Processor
File . : DDSFUN      Library . : SAMPLER      Type of file . : Printer Auxiliary
          Device File Attributes
Externally described file . . . . . : Yes
File level identifier . . . . . : 0960129103427
Creation date . . . . . : 01/29/96
Text 'description' . . . . . : TEXT          DDS Functionality
Spool the data . . . . . : SPOOL            *YES
Maximum devices . . . . . : 1
User specified DBCS data . . . . . : IGCDTA  *NO
DBCS capable . . . . . : No
Maximum file wait time . . . . . : WAITFILE *IMMED
Share open data path . . . . . : SHARE      *NO
Record format level check . . . . . : LVLCHK *YES
Number of record formats . . . . . : 10
User buffer length . . . . . : 121
Number of devices . . . . . : 1
Separate indicator area . . . . . : INDARA   No
Printer Attributes
Device . . . . . : DEV                      *JOB
Printer device type . . . . . : DEVTYPE     *AFPD5
Page size . . . . . : PAGESIZE

```



```

Length . . . . . : 66
Width . . . . . : 132
Measurement Method . . . . . : *ROWCOL
Lines per inch . . . . . : LPI 6
Characters per inch . . . . . : CPI 10
Front margin . . . . . : FRONTMGN *DEVD
Back margin . . . . . : BACKMGN *FRONTMGN
Overflow line number . . . . . : OVRFLW 64
Fold records . . . . . : FOLD *NO
Degree of page rotation . . . . . : PAGRTT *AUTO
Hardware justification . . . . . : JUSTIFY 0
Print on both sides . . . . . : DUPLEX *NO
Defer Write . . . . . : DFRWRT *YES
Unprintable character action : RPLUNPRT
  Replace character . . . . . : *YES
  Replacement character . . . . . : ' ' X'40'
Print text . . . . . : PRTTXT *JOB
Align page . . . . . : ALIGN *NO
Control character . . . . . : CTLCHAR *NONE
Channel values . . . . . : CHLVAL *NORMAL
Fidelity . . . . . : FIDELITY *CONTENT
Printer quality . . . . . : PRTQLTY *STD
Form feed . . . . . : FORMFEED *DEVD
Source drawer . . . . . : DRAWER 1
Output bin . . . . . : OUTBIN *DEVD
Font
  Identifier . . . . . : *CPI
  Point size . . . . . : *NONE
Character identifier . . . . . : CHRID *DEVD
Font character set . . . . . : FNTCHRSET *FONT
Coded font . . . . . : CDEFNT *FNTCHRSET
Form type . . . . . : FORMTYPE *STD
Pages per side . . . . . : MULTIUP 1
Reduce output . . . . . : REDUCE *TEXT
Unit of measure . . . . . : UOM *INCH
Front side overlay . . . . . : FRONTOVL *NONE
Back side overlay . . . . . : BACKOVL *FRONTOVL
DBCS extension characters . . . . . : IGCEXNCHR *YES
DBCS character rotation . . . . . : IGCCHRRTT *NO
DBCS characters per inch . . . . . : IGCCPI *CPI
DBCS SO/SI spacing . . . . . : IGCSOSI *YES
DBCS Coded font . . . . . : IGCCDEFNT *SYSVAL
Spooled output queue . . . . . : OUTQ *JOB
Max spooled output records . . . . . : MAXRCDS 100000
Spooled output schedule . . . . . : SCHEDULE *FILEEND
Copies . . . . . : COPIES 1
Page range to print : PAGERANGE
  Starting page . . . . . : 1
  Ending page . . . . . :
File separators . . . . . : FILESEP *END
Hold spooled file . . . . . : HOLD *NO
Save spooled file . . . . . : SAVE *NO
Output priority (on OUTQ) . . . . . : OUTPTY *JOB
User data . . . . . : USRDTA *SOURCE

```

Record Format List									
Format	Fields	Record Length	Format Level Identifier	Point Font Size	Page Rotation	Lines Per Inch	Character Width	Size Height	
HEADR1	4	80	17388A22B7769		0				
Text :									
LINE1	0	0	0140A15C5F181						
Text :									
BOX1	0	0	0031727F14081						
Text :									
TXT0	2	70	192A19611C528						
Text :									
TXT1	5	121	18FA5BBF283C7						
Text :									
TXT3	4	24	15706E52AA09E						
Text :									
BAR1	2	16	14F153C6CF1CC						
Text :									
TXT2	5	40	19F4B514D04F4						
Text :									
PSG1	1	8	1442B1CB355D8						
Text :									
OVL1	1	8	1463A28C673D7						
Text :									

Total number of formats	:	10
Total number of fields	:	24
Total record length	:	367

The printer file parameters that set up the multiple function printing job are shown below. All of the parameters are defaults, except for DEVTYPE(*AFPDS) and OVRFLW(64).

DEVTYPE	*AFPDS specifies that an AFP print data stream will be created.
PAGESIZE	Length is 66, which at the 6 LPI setting means an 11-inch form.
LPI	Default lines per inch is 6.
FRONTMGN	*DEVD specifies the margins of the printer, which are zero down and zero across for a printer without an unprintable border.
OVRFWL	64 is the overflow line. Overflow is triggered for a DDS print record that uses traditional spacing and skipping, not the POSITION keyword.
PAGRRT	A page rotation setting of *AUTO means the system rotates the page or uses computer output reduction (*COR) in order to print the page. In this case, a page rotation of 0 is selected.
DRAWER	The default printer drawer is 1.
OUTBIN	The default printer output bin is *DEVD, which uses the output bin specified in the printer device description.
CHRID	*DEVD specifies that the default character set is in the printer device description. That value is 011, the font global identifier (FGID) for the Courier 10 font. Therefore, any text to be printed that does not specify a substitute font (using the FONT, FNTCHRSET, or CDEFNT keywords) prints in Courier 10. The default code page is located in the QCHRID system value.
UOM	The default unit of measure is inches.

Super Sun Seeds Case Study

The case study discussed in this section takes a standard invoice application, Super Sun Seeds, (see Figure 7 on page 30) and using the functions described in previous sections, transforms the invoice into DDS-enhanced output.

Consider the pre-DDS Super Sun Seeds invoice as being printed on multipart, preprinted forms on an impact printer. The preprinted form provides the invoice form, but it limits the preprinted format to one form, with the same heading, detail, and total elements on each page. Multipage invoices are only customized by printing **Continued** in the **Total Due** box, and by specifying a page number. Invoice output is naturally collated, whether the workflow requires it or not (it usually does not). Uncollated pages are obtained by bursting and decollating preprinted forms and by placing them in separate stacks.

Collated means all copies for a given invoice are together. Uncollated means that all customer copies are in one stack, all packing lists are in another, and so on.

The new DDS version of the Super Sun Seeds application (program INVNEW1) is a tailored, multipage electronic invoice. The fictional customer, Improved Printing

Corporation, has 16 line items so their invoice fits on one page as shown in Figure 64.




600 CFC Parkway Parsippany, NJ 05080		 A Growth Company		Office: 333-489-3367 Fax: 333-413-9784																																																																																																			
IMPROVED PRINTING CORP PERFORMANCE BOULEVARD PRINTERSVILLE CO 45789-2637			SAME																																																																																																				
-- Sold To --			-- Ship To --																																																																																																				
Customer Number:	100	Invoice Number:	31300	Invoice Date:	3/12/96	Payment Date:	4/12/96																																																																																																
Ship Via: BEST WAY		Shipped Date: 3/12/96		Terms: NET 30		Salesman: YOUR PRINTER REP																																																																																																	
<table><tr><td>1</td><td>CT</td><td>00000300</td><td>HIGH ALTITUDE WATERMELON</td><td>1.01</td><td>1.01</td></tr><tr><td>1</td><td>PK</td><td>01100517</td><td>SPARTAN SEEDS</td><td>2.39</td><td>2.39</td></tr><tr><td>9</td><td>PK</td><td>04569870</td><td>NORTHERN LITE BLUE SPRUCE</td><td>858.32</td><td>7,724.88</td></tr><tr><td>12</td><td>EX</td><td>11005004</td><td>BUSH GREEN SEEDS</td><td>2.50</td><td>30.00</td></tr><tr><td>12</td><td>CT</td><td>11005011</td><td>LASSO RED SEEDS</td><td>892.23</td><td>10,706.76</td></tr><tr><td>26</td><td>PK</td><td>11005018</td><td>EARLY BANTAM SEEDS</td><td>.38</td><td>9.88</td></tr><tr><td>5</td><td>EX</td><td>11005893</td><td>AFRICAN DAISY, SEEDS</td><td>2.35</td><td>11.75</td></tr><tr><td>1</td><td>PK</td><td>15975365</td><td>HEAVY OAK</td><td>129.09</td><td>129.09</td></tr><tr><td>33</td><td>EX</td><td>32746510</td><td>HOPS BREWING LIGHT</td><td>1.20</td><td>39.60</td></tr><tr><td>6</td><td>EA</td><td>46578913</td><td>SEED SURVEYING SITE</td><td>50.00</td><td>300.00</td></tr><tr><td>2</td><td>EX</td><td>56413213</td><td>POT POT</td><td>7.65</td><td>15.30</td></tr><tr><td>80</td><td>PK</td><td>65412384</td><td>SEED SCRUBBER</td><td>888.79</td><td>71,103.20</td></tr><tr><td>1</td><td>PK</td><td>84512023</td><td>OREGON SPRING TOMATO SEED</td><td>.97</td><td>.97</td></tr><tr><td>2</td><td>DZ</td><td>96325874</td><td>PINEAPPLE-ORANGE SEEDS</td><td>1.29</td><td>2.58</td></tr><tr><td>11</td><td>EX</td><td>98412006</td><td>BLACK BEAUTY ZUCCHINI</td><td>2.30</td><td>25.30</td></tr><tr><td>5</td><td>EA</td><td>98546320</td><td>FROZEN JUICE PROCESSOR</td><td>109.90</td><td>549.50</td></tr></table>								1	CT	00000300	HIGH ALTITUDE WATERMELON	1.01	1.01	1	PK	01100517	SPARTAN SEEDS	2.39	2.39	9	PK	04569870	NORTHERN LITE BLUE SPRUCE	858.32	7,724.88	12	EX	11005004	BUSH GREEN SEEDS	2.50	30.00	12	CT	11005011	LASSO RED SEEDS	892.23	10,706.76	26	PK	11005018	EARLY BANTAM SEEDS	.38	9.88	5	EX	11005893	AFRICAN DAISY, SEEDS	2.35	11.75	1	PK	15975365	HEAVY OAK	129.09	129.09	33	EX	32746510	HOPS BREWING LIGHT	1.20	39.60	6	EA	46578913	SEED SURVEYING SITE	50.00	300.00	2	EX	56413213	POT POT	7.65	15.30	80	PK	65412384	SEED SCRUBBER	888.79	71,103.20	1	PK	84512023	OREGON SPRING TOMATO SEED	.97	.97	2	DZ	96325874	PINEAPPLE-ORANGE SEEDS	1.29	2.58	11	EX	98412006	BLACK BEAUTY ZUCCHINI	2.30	25.30	5	EA	98546320	FROZEN JUICE PROCESSOR	109.90	549.50
1	CT	00000300	HIGH ALTITUDE WATERMELON	1.01	1.01																																																																																																		
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5	EA	98546320	FROZEN JUICE PROCESSOR	109.90	549.50																																																																																																		
				Thank You because you have ordered over \$500 of seeds this year, on your next seed order you will receive a 10% discount.																																																																																																			
This invoice overlay designed using IBM AFP Utilities/400				Total Due		\$90,652.21																																																																																																	
Return this tear-off strip with your payment.																																																																																																							
Payment is due by: 4/12/96				Make Checks Payable to: Super Sun Seeds																																																																																																			
				Amount Due is: \$90,652.21																																																																																																			
IMPROVED PRINTING CORP PERFORMANCE BOULEVARD PRINTERSVILLE CO 45789-2637																																																																																																							

Figure 64. New One Page DDS Version of Super Sun Seeds Invoice

The fictional customer, Organic Garden Supplies, on the other hand, has ordered 46 line items so their invoice is two pages long. The first page of their invoice is shown in Figure 65 on page 146.



		Office: 555-499-2367 Fax: 555-415-9794		
400 C/PU Parkway Vegetation, NJ 55090				
ORGANIC GARDEN SUPPLIES 546 PRODUCE WAY GOLDEN OATS CO 94523-4852		ORGANICS-ON-THE-MOVE 3872 NATURE'S WAY NOCHEMS AK 49972-5341		
-- Sold To --		-- Ship To --		
Customer Number:	136	Invoice Number:	31336	
		Invoice Date:	3/13/96	
		Payment Date:	4/13/96	
Ship Via: CLEAN TRK		Shipped Date:	3/13/96	
		Terms:	NET 30	
		Salesman:	CHRIS SEEDER	
QTY	UNIT	DESCRIPTION	PRICE	AMOUNT
90	CT	00000300 HIGH ALTITUDE WATERMELON	1.01	90.90
550	CT	00000300 HIGH ALTITUDE WATERMELON	1.01	555.50
100	EA	00001200 ARBOLES DEL SUR	45.00	4,500.00
25	EA	00231300 SEED ROASTER OVEN SET	199.99	4,999.75
150	PK	04569870 NORTHERN LITE BLUE SPRUCE	858.32	28,748.00
2	EX	11005000 PAVA SEEDS	3.90	7.80
2	EX	11005001 PURPLE TEEPEE SEEDS	4.44	8.88
52	EX	11005002 BUSH WAX SEEDS	2.00	104.00
52	EX	11005003 KINGHORN WAX SEEDS	2.13	110.76
8	EX	11005004 BUSH GREEN SEEDS	2.50	20.00
8	EX	11005005 BLUE LAKE GREEN SEEDS	4.00	32.00
2	EX	11005006 KINGHORN WAX SEEDS	3.00	6.00
2	CT	11005007 VENTURE GREEN SEEDS	1.50	3.00
100	CT	11005008 NORTHEASTERN POLE SEEDS	1.29	129.00
100	CT	11005009 KENTUCKY BLUE SEEDS	2.10	210.00
58	CT	11005010 EARLY DWARF DANISH SEEDS	3.01	174.58
58	CT	11005011 LASSO RED SEEDS	892.23	51,749.34
84	EA	11005012 BLUE MAX SAVOY BEANS	1.23	103.32
84	DZ	11005013 MINCOR NANTES CARROT SEED	.87	73.08
10	DZ	11005014 SCARLET NANTES SEEDS	5.90	59.00
5	DZ	11005014 SCARLET NANTES SEEDS	5.90	29.50
10	EZ	11005015 CHANTENAY SEEDS	2.19	21.90
63	EZ	11005016 TOUCHON SEEDS	2.83	178.29
65	EZ	11005016 TOUCHON SEEDS	2.83	183.95
2	PK	11005018 EARLY BANTAM SEEDS	.38	.76
2	PK	11005019 NORTHERN PICKLING SEEDS	.39	.78
90	PK	11005020 FRENCH PICKLING SEEDS	2.39	215.10
100	EX	11057893 AFRICAN DAISY, SEEDS	2.35	235.00
25	CT	12382910 SUCCATASH SEEDS	.38	9.50
45	CT	13145340 SOUR GRAPE SEEDS	.15	6.75
10	PT	15789342 BLUE BELLES, BRIGHT BLUE	18.57	185.70
50	PK	15975365 HEAVY OAK	129.09	6,454.50
25	EA	31321654 BELLSTAR SEEDS	7.88	197.00
2	EA	31321654 BELLSTAR SEEDS	7.88	15.76
25	DZ	32154657 PETERSEBURG PALM TREE	34.90	872.50
6	EZ	32165478 BLACK EYED BANANA	3.01	18.06
45	EX	32746510 HOPS BREWING LIGHT	1.20	54.00
10	CT	35456031 SUNNY SUNFLOWER SEEDS	1.23	12.30

This invoice overlay designed using IBM AFP Utilities/400

Page 1

Figure 65. Page One of Two-Page DDS Version of Super Sun Seeds Invoice

The second page of the Organic Garden Supplies invoice consists of a shortened heading, sales offer (with strawberry image), and the payment coupon as shown in Figure 66 on page 147.

400 CPU Parkway Vegetation, NJ 55090		 Super Sun Seeds A Growth Company		Office: 555-499-2367 Fax: 555-415-9794	
ORGANIC GARDEN SUPPLIES					
Customer Number: 136		Invoice Number: 31336		Invoice Date: 3/13/96	
				Payment Date: 4/13/96	
QTY	UNIT	PRICE	DESCRIPTION	UNIT PRICE	AMOUNT
50	EA	35715924	SEED SIPPER SET	2,900.00	45,000.00
18	EA	40113254	FRESH FRUIT CANNED CANNER	22.97	413.46
6	EX	56413213	POT POT	7.65	45.90
1000	PK	64132029	PITLESS PEACH SEEDS	.97	970.00
500	EA	90978412	TREE TRIMMER TUBING	.20	100.00
6	CT	94875081	EARLIRIDGE TOMATO SEEDS	.49	2.94
45	EX	98412006	BLACK BEAUTY ZUCCHINI	2.30	103.50
5	EA	98546320	FROZEN JUICE PROCESSOR	109.90	549.50
 Thank You Because you have ordered over \$500 of fruit this year, on your next fruit order you will receive a 10% discount.					
This invoice overlay designed using IBM AFP Utilities/400				Total Due	
				\$147,561.56	

Return this tear-off strip with your payment.

Payment is due by: 4/13/96

ORGANIC GARDEN SUPPLIES
546 PRODUCE WAY
GOLDENHATS
CO 94523-4852

Make Checks Payable to:

Super Sun Seeds

Amount Due is: \$147,561.56

Figure 66. Page Two of Two-Page DDS Version of Super Sun Seeds Invoice

Multiple electronic forms are used to customize the format for one, two, and more page invoices. This approach can be more customized by using a floating overlay (described later in this chapter) so that the electronic form exactly matches the individual customer transactions. Additionally, a postal bar code can be added to the address, as well as a payment coupon with the customer number and invoice amount encoded in bar code, and a custom marketing offer with tailored images and discounts.

Figure 67 on page 148 shows the electronic overlays used to construct one, two, or more page invoices. For example, a one page invoice can fit the full ship to and bill to heading, the item detail lines, and payment coupon all on one page. The invoice only uses the INVALL overlay. A multiple page invoice would have the full heading with item details on the first page (INVFST), the continuation heading and item details on the middle pages (INVMID), and the continuation heading, item details and payment coupon on the last page (INVLST).

600	A*	- Overflow Line (OVRFLW)		64	
700	A*	- Print on Both Sides (DUPLEX)		*YES	
800		if running on duplex printer			
900	A*				
1000	A*	Page 1 Header			
1100	A*-	includes Postnet Zip+4			
1200	A*				
1300	A	R INVTOP			SKIPB(10)
1400	A	ZIPPN	9S	12	BARCODE(POSTNET)
1500	A				SPACEA(2)
1600	A	NAME	25A	12	
1700	A	STNAME	25A	48	
1800	A				SPACEA(1)
1900	A	STREET	25A	12	
2000	A	STSTRT	25A	48	
2100	A				SPACEA(1)
2200	A	CITY	25A	12	
2300	A	STCITY	25A	48	
2400	A				SPACEA(1)
2500	A	STATE	2A	12	
2600	A	ZIP	9S	16	EDTWRD(' - ')
2700	A	STSTE	2A	48	
2800	A	STZIP	9S	52	EDTWRD(' - ')
2900	A				SPACEA(3)
3000	A	CUST#	6S 0	14	EDTCDE(Z)
3100	A	INVC#	6S 0	32	EDTCDE(Z)
3200	A			49	DATE EDTCDE(Y)
3300	A	PAYDAT	6S 0	66	EDTCDE(Y)
3400	A				SPACEA(2)
3500	A	SHPVIA	10A	14	
3600	A			34	DATE EDTCDE(Y)
3700	A	TERMS	10A	47	
3800	A	SLSMAN	16A	64	
3900	A				SPACEA(4)
4000	A*				
4100	A*	Page 2 Header			
4200	A*				
4300	A	R INVTP2			SKIPB(10)
4400	A	NAME	25A	12	
4500	A				SPACEA(2)
4600	A	CUST#	6S 0	14	EDTCDE(Z)
4700	A	INVC#	6S 0	32	EDTCDE(Z)
4800	A			49	DATE EDTCDE(Y)
4900	A	PAYDAT	6S 0	66	EDTCDE(Y)
5000	A				SPACEA(4)
5100	A*				
5200	A*	Detail Lines			
5300	A*				
5400	A	R DETLIN			SPACEA(1)
5500	A	QTY	4S 0	8	EDTCDE(Z)
5600	A	UOM	2A	13	
5700	A	ITEM#	8S 0	18	
5800	A	ITMDES	25A	28	
5900	A N51	SELPRC	6S 2	58	EDTCDE(J)
6000	A N51	EXTPRC	7S 2	70	EDTCDE(J)
6100	A*				
6200	A*	Multipage Message			
6300	A*				
6400	A	R PAGEOF			
6500	A	PAGCON	4A		POSITION(10.7 7.3)
6600	A				FNTCHRSET(C0H200A0 T1V10037)
6700	A	PAGCNT	2S 0		POSITION(10.7 7.8)
6800	A				FNTCHRSET(C0H200A0 T1V10037)
6900	A				EDTCDE(Z)
7000	A	PAGNAM	25A		POSITION(10.7 3.8)
7100	A				FNTCHRSET(C0H400B0 T1V10037)
7200	A*				

```

7300      A* Invoice Totals
7400      A* - includes Interleaf 2 of 5 bar code
7500      A*
7600      A          R INVBOT          SKIPB(51)
7700      A N51      TOTDUE          9S 2      67 EDTWRD(' , , $0. -')
7800      A          SPACEA(4)
7900      A 51          67 ' '
8000      A          SPACEA(4)
8100      A          PAYDA@          6S 0      25 EDTCDE(Y)
8200      A N51      TOTD@2          9S 2      67 EDTWRD(' , , $0. -')
8300      A          SPACEA(2)
8400      A 51          67 ' '
8500      A          SPACEA(2)
8600      A          NAME@2          25A      12
8700      A          SPACEA(1)
8800      A          STRE@2          25A      12
8900      A          BARPRC          15S 0      52BARCODE(INTERL20F5 3)
9000      A          SPACEA(1)
9100      A          CITY@2          25A      12
9200      A          SPACEA(1)
9300      A          STAT@2          2A      12
9400      A          ZIP@2          9A      16
9500      A*
9600      A* Offer Print
9700      A* - Font 92 is Courier Italic 12-pitch
9800      A*
9900      A          R OFFER          SKIPB(43)
10000     A          FONT(92)
10100     A          OFFR@1          24A      36
10200     A          SPACEA(1)
10300     A          OFFR@2          24A      36
10400     A          SPACEA(1)
10500     A          OFFR@3          24A      36
10600     A          SPACEA(1)
10700     A          OFFR@4          24A      36
10800     A          SPACEA(1)
10900     A          OFFR@5          24A      36
11000     A          SPACEA(1)
11100     A          OFFR@6          24A      36
11200     A          SPACEA(1)
11300     A*
11400     A* Images/Page Segments
11500     A* - variable page segment name from program
11600     A*
11700     A          R PAGSEG          PAGSEG(&PSEG 7.0 2.6)
11800     A          PSEG          8A P
11900     A*
12000     A*
12100     A* Images/Page Segments
12200     A* - variable overlay name from program
12300     A*
12400     A          R PRTOVL          OVERLAY(&OVLAY 0 0)
12500     A          OVRLAY          8A P
12600     A*
12700     A* Forces page advance
12800     A*
12900     A          R ENDPAG          ENDPAGE

```

* * * * E N D O F S O U R C E * * * *

The DDS printer file used to create the invoice output shown in Figure 67 on page 148 is divided into seven records as follows:

INVTOP

Full invoice heading information

INVTP2

Continuation heading, on multipage invoice

DETLIN

Detail lines format

INVBOT

Invoice bottom, or payment coupon

OFFER

Discount offer

PAGSEG

Print variable page segment, using:

FLWRNB Seed Image
 STRWNB Strawberry Image
 TREENB Tree Image
 BETLNB Beetle Image

PRTOVL

Print variable overlay, as follows:

INVALL Whole or 1-page invoice overlay
 INVST First page of multipage invoice overlay
 INVMID Middle page of multipage invoice overlay
 INVLST Last page of multipage invoice overlay

RPG Source for New Invoice Output (INVNEW1)

The following example shows the RPG source used to produce the new Super Sun Seeds invoice output example shown in Figure 67 on page 148.

```

5763PW1 V3R2M0 960917          SEU SOURCE LISTING    03/03/96 17:47:37    1
SOURCE FILE . . . . . SAMPLER/QRPGSRC
MEMBER . . . . . INVNEW1
SEQNBR*...+... 1 ...+... 2 ...+... 3 ...+... 4 ...+... 5 ...+... 6 ...+... 7 ...+... 8
100      * INVNEW1 - Super Sun Seeds Electronic Invoice
200      *          Example 1
300      *
400      * This program reads a transaction file (SEEDDETL), retrieves info
500      * from item master (SEEDITEM) and customer master (SEEDCUST), then
600      * prints invoices.
700      *
800      * Different electronic overlays are used depending on whether this
900      * is a one page or multipage invoice, as well as whether there is
1000     * room remaining on the invoice to print a customer offer. The following
1100     * overlays are used:
1200     *
1300     *   INVALL      1-page invoice (full address at top, payment at bottom)
1400     *   INVST      Page 1 of multipage invoice (no payment at bottom)
1500     *   INVMID      Continuation page (No address, payment at bottom)
1600     *   INVLST      Last page of multipage invoice
1700     *
1800     * Invoice detail lines are processed until either end of customer order
1900     * or lines=35, at which time the invoice page is printed. At end of
2000     * order, a check is made to see if there are more than 18 detail lines
2100     * to print. If there are, that would not leave room in the invoice body
2200     * to print the customer offer. In this case, the page is printed, and a
2300     * new final page is built with the offer and the payment coupon.
2400     *
2500     * The offer is a message (and corresponding image, or page segment) based
2600     * on item sales in the customer master. For example, a flower image
2700     * would print if seed sales exceeded $500.
2800     *
2900     * ENHANCEMENTS:
3000     * See program INVNEW2 for the following functional enhancements:
3100     *
3200     *   1. Multiple copies of invoice with routing designation, such as
3300     *      "Customer Copy", "File Copy", etc.

```

3400	*	2. Overlay specifying terms and conditions to print on back of				
3500	*	customer copy.				
3600	*	3. Packing List copy that suppresses prices				
3700	*					
3800	FSEEDDETLIP	E	K	DISK		
3900	FSEEDITEMIF	E	K	DISK		
4000	FSEEDCUSTIF	E	K	DISK		
4100	FINVNEW1	O E		PRINTER		
4200	*					
4300	E		WDS	1 40 24		Text for Offer
4400	*					
4500	IINVCDETL	01				
4600	I				STNAME	32
4700	I				CUST# L1	
4800	ICUSTDATA	02				
4900	IITEMDATA	03				
5000	*					
5100	IBARTOT	DS				
5200	I			1	60CUST#	
5300	I			7	152TODTUE	
5400	*					
5500	IPAYDAA	DS				
5600	I			1	20PAYMO	
5700	I			3	40PAYDA	
5800	I			5	60PAYR	
5900	*					
6000	C	*IN90	IFEQ '0'			First Pass Only
6100	C		SETON		90	
6200	C		EXSR DATESR			
6300	C		MOVE 'Page'	PAGCON	4	Page constant
6400	C		ENDIF			
6500	*					
6600	C	*INL1	IFEQ '1'			Start Customer
6700	C	CUST#	ADD 31200	INVC#	60	Invent Invoice#
6800	C		Z-ADD0	TODTUE	92	Reset Totals/Ctrs
6900	C		Z-ADD0	ITMCNT	30	
7000	C		Z-ADD0	PAGCNT	20	
7100	C	CUST#	CHAINSEEDCUST		20	
7200	C	32	MOVE ' SAME'	STNAME		
7300	C		Z-ADDZIP	ZIPPN	90	
7400	C*					
7500	C		WRITEINVTOP			
7600	C*					
7700	C		ENDIF			
7800	C*					
7900	C	*IN01	CABNE'1'	ENDDT		Item Processing
8000	C		ADD 1	ITMCNT		
8100	C	ITM1	CHAINSEEDITEM		21	
8200	C*					
8300	C	QTY1	MULT SELPRC	EXTPRC	72	
8400	C		Z-ADDQTY1	QTY	40	
8500	C	EXTPRC	ADD TODTUE	TODTUE		
8600	C*					
8700	C		WRITEDETLIN			Write Detail Line
8800	C*					
8900	C	ITMCNT	IFEQ 35			Full 1st Page
9000	C		ADD 1	PAGCNT		
9100	C	PAGCNT	IFEQ 1			
9200	C		MOVE 'INVST	'OVLAY	8	Long Page 1 Ovly
9300	C		ELSE			
9400	C		MOVE 'INVMID	'OVLAY		Cont. Ovly
9500	C		ENDIF			
9600	C		WRITEPAGEOF			Pg 1 of 2 Msg
9700	C		WRITEPRTOVL			Print Overlay
9800	C		WRITEENDPAGE			End Page
9900	C		WRITEINVT2			Next Page Header
10000	C		Z-ADD0	ITMCNT		

10100	C		ENDIF			
10200	C*					
10300	C	ENDDT	TAG			
10400	C*					
10500	CL1	ITMCNT	IFGT 18			No Room for PSEG
10600	CL1		ADD 1	PAGCNT		
10700	CL1		MOVE 'INVST	'OVLAY 8		Lng Pg 1 Ovly
10800	CL1		WRITEPAGEOF			Pg 1 of 2 sg
10900	CL1		WRITEPRTOVL			Print Overlay
11000	CL1		WRITEENDPAGE			End Page
11100	CL1		WRITEINVTP2			Page 2 Heading
11200	CL1		ENDIF			
11300	C*					
11400	CL1		MOVE BARTOT	BARPRC 150		Load Totals
11500	CL1		Z-ADDTOTDUE	TOTD02 92		
11600	CL1		MOVE NAME	NAME02 25		
11700	CL1		MOVE STREET	STRE02 25		
11800	CL1		MOVE CITY	CITY02 25		
11900	CL1		MOVE STATE	STAT02 2		
12000	CL1		Z-ADDZIP	ZIP02 90		
12100	C*					
12200	CL1		EXSR OFFSR			
12300	CL1	PAGCNT	IFGT 0			
12400	CL1		MOVE 'INVLST	'OVLAY 8		Cont. Overlay
12500	CL1		ELSE			
12600	CL1		MOVE 'INALL	'OVLAY		1 Page Invoice
12700	CL1		ENDIF			
12800	CL1 30		WRITEOFFER			Write Offer and
12900	CL1 30		WRITEPAGSEG			Page Segment
13000	CL1		WRITEINVBOT			Invoice Totals
13100	CL1		WRITEPRTOVL			Print Overlay
13200	CL1		WRITEENDPAGE			End Page
13300	CL1		SETOF		30	
13400	C* Set up Date					
13500	CSR	DATESR	BEGSR			
13600	CSR		Z-ADDUDAY	PAYDA		
13700	CSR	UMONTH	ADD 1	PAYMO		
13800	CSR	PAYMO	IFGT 12			
13900	CSR		Z-ADD1	PAYMO		
14000	CSR	UYEAR	ADD 1	PAYYR		
14100	CSR		ELSE			
14200	CSR		Z-ADDUYEAR	PAYYR		
14300	CSR		ENDIF			
14400	CSR		MOVE PAYDAA	PAYDAT 60		
14500	CSR		Z-ADDPAYDAT	PAYDA0 60		
14600	CSR		ENDSR			
14700	* Set up Offer at end of invoice					
14800	CSR	OFFSR	BEGSR			
14900	CSR	SLSSD	IFGE 500			
15000	CSR		Z-ADD1	IX 20		
15100	CSR		MOVE 'FLWRNB	'PSEG 8		Seed
15200	CSR		SETON		30	
15300	CSR		GOTO WRTOFR			
15400	CSR		ENDIF			
15500	CSR	SLSFRT	IFGE 500			
15600	CSR		Z-ADD7	IX		Strawberry
15700	CSR		MOVE 'STRWNB	'PSEG		
15800	CSR		SETON		30	
15900	CSR		GOTO WRTOFR			
16000	CSR		ENDIF			
16100	CSR	SLSSUP	IFGE 500			
16200	CSR		Z-ADD13	IX		
16300	CSR		MOVE 'TREENB	'PSEG		Tree
16400	CSR		SETON		30	
16500	CSR		GOTO WRTOFR			
16600	CSR		ENDIF			
16700	CSR	SLSCHM	IFGE 500			

```

16800      CSR                      Z-ADD19      IX
16900      CSR                      MOVE 'BETLNB  'PSEG      Beetle
17000      CSR                      SETON
17100      CSR                      GOTO WRTOFR      30
17200      CSR                      ENDIF
17300      C*
17400      CSR                      GOTO ENDOFR
17500      C*
17600      CSR                      WRTOFR      TAG
17700      CSR                      MOVE WDS,IX      OFFR@1 24      Build Offer Text
17800      CSR                      ADD 1      IX
17900      CSR                      MOVE WDS,IX      OFFR@2 24
18000      CSR                      ADD 1      IX
18100      CSR                      MOVE WDS,IX      OFFR@3 24
18200      CSR                      ADD 1      IX
18300      CSR                      MOVE WDS,IX      OFFR@4 24
18400      CSR                      ADD 1      IX
18500      CSR                      MOVE WDS,IX      OFFR@5 24
18600      CSR                      ADD 1      IX
18700      CSR                      MOVE WDS,IX      OFFR@6 24
18800      CSR                      ENDOFR      ENDSR
18900      C*
19000      *
19100      ** WDS      WORDS FOR OFFER
19200      Thank You .....
19300      Because you have ordered
19400      over $500 of seeds this
19500      year, on your next seed
19600      order you will receive
19700      a 10% discount.
19800      Thank You .....
19900      Because you have ordered
20000      over $500 of fruit this
20100      year, on your next fruit
20200      order you will receive
20300      a 10% discount.
20400      Thank You .....
20500      Because you have ordered
20600      over $500 of trees this
20700      year, on your next tree
20800      order you will receive
20900      a 10% discount.
21000      Thank You .....
21100      Because you have ordered
21200      over $500 of stuff this
21300      year, on your next stuff
21400      order you will receive
21500      a 10% discount.
21600

```

* * * * E N D O F S O U R C E * * * *

The RPG program shown above uses the logic described in the following sections to build the Super Sun Seeds invoices.

Beginning the Invoice

To begin the invoice, do the following:

1. Read Customer Master (SEEDCUST)
2. Reset invoicing totals

Processing Items

To process the items on the invoice, do the following:

1. Read records from transaction file (SEEDDETL)
2. Do item calculations
3. Write detail line using DETLIN format

Overflow Items (ITMCNT = 35)

To process overflow items, do the following:

1. If page 1, use overlay INVST
2. If page n, use overlay INVMID
3. Write PRTOVL to print overlay
4. Write INVTP2 to eject page and print continuation header

Ending the Invoice (No Room for Offer)

If there is no more room on the invoice, end it by doing the following:

1. If page 1, use overlay INVST
2. If page n, use overlay INVMID
3. Write PRTOVL to print overlay
4. Write INVTP2 to eject page and print continuation header

Ending the Invoice

If the invoice still has room left on it but it should be ended anyway, do the following:

1. If page 1, use overlay INVST or INVALL
2. If page n, use overlay INVLST
3. Select page segment image and discount offer
4. Write OFFER to print offer
5. Write PAGSEG to print image
6. Write INVBOT to print invoice total/payment coupon
7. Write PRTOVL to print overlay

Referring again to the DDS printer specifications for the new Super Sun Seeds application, the special functions can be summarized in each print record as follows:

INTOP	All program fields are printed in the default font (Courier). The 9-digit zip code is printed in postal bar code. The ship to and bill to lines use standard (based on 6 LPI) spacing and skipping. No exact positioning (down and across) is done.
INTP2	Continuation header is printed, again with standard skipping and spacing.
DETLIN	Detail lines are printed in Courier at 10 lines per inch.
INVBOT	Payment coupon is printed. A field containing the customer number and total amount due is printed in Interleaved 2 of 5 bar code.

OFFER	The special discount offer is printed in FONT(92), or Courier Italic 12-pitch.
PAGSEG	The program passes the page segment name (based on customer sales data), and the page segment is printed 7.0 inches down and 2.6 inches across the page.
PRTOVL	The program passes the appropriate overlay in the OVRLAY field, and it is printed at 0 inches down and 0 inches across the page.

Enhancing the Super Sun Seeds Invoice

The Super Sun Seeds invoice is an effective business document, making use of electronic forms, bar coding, custom images and marketing messages. Because it is an electronic document, it easily can be updated or changed.

A number of enhancements to the Super Sun Seeds invoicing application can significantly add to its value as a document:

- A standard set of terms and conditions can be printed on the back side of selected pages. This is called a constant back form or overlay.
- A set of collated copies of the invoice can be automatically produced. A packing list and a file copy, for example.
- The information on the copies can be tailored. For example, pricing information on the packing list can be suppressed.
- The variable positioning capabilities of DDS can be used to create a dynamic or “floating” invoice, one in which the form itself is tailored exactly to customer data.

Two additional Super Sun Seeds invoice examples, INVNEW2 and INVNEW3, demonstrate how to add the functions described above. INVNEW2 implements the copies, price suppression, and constant back overlay. INVNEW3 adds the dynamic, or floating, form. The RPG and DDS source for INVNEW2 and INVNEW3, as well as the output for both examples can be found in “Appendix B. Additional DDS Examples” on page 289.

The following sections show how the enhancements described above were made.

Specifying Constant Back Overlays

An invoice, or similar document, may need a set of instructions or terms and conditions printed on the back side. This cannot be done with the BACKOVL parameter of the printer file because it cannot force the required page eject. For the Super Sun Seeds application, simply use the PRTOVL record format to print the back side overlay and add the ENDPAGE keyword to force the page eject. A sample of the terms and conditions form (INVBAC) is shown in Figure 52 on page 105.

Specifying Copies

A typical invoicing application would be required to create more than just the customer copy of the bill. Copies of the invoice, such as a packing list, a file copy, and an accounting copy are the norm. In addition, the paper workflow may require that the copies are either collated or uncollated.



		400-222-2222 Vegetation, NJ 05000		Option: 333-450-3367 Fax: 333-413-0704																																																																																																	
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Figure 69. Super Sun Seeds Packing List

Floating Document Elements

The ability of DDS to variably place document elements such as lines, boxes, page segments, and overlays enables you to precisely tailor the output to the application data. You can float these elements on the page; that is, actually change the document structure as the data changes.

For example, consider a brokerage statement. It has sections for portfolio transactions, checking transactions, portfolio balances, and other categories. The transactions are all placed in separate boxes or frames on the statement. Those frames end precisely when the customer transactions end. The result is a document tailored for that customer.

As shown in the Super Sun Seeds invoice example, you can use DDS to accomplish the same thing. While the invoice was tailored depending upon whether it was a one, two, or more page document, it still has a fixed frame for the detailed line items. A customer invoice with five line items has a frame that is part of the 35

line item overlay. If DDS line keywords are used, the frame can be built dynamically; that is, as line items are processed. If five line items are all the customer needs, that is all that is drawn.

Program INVNEW3 implements the Super Sun Seeds invoice as a floating document. A sample of the output is shown below.

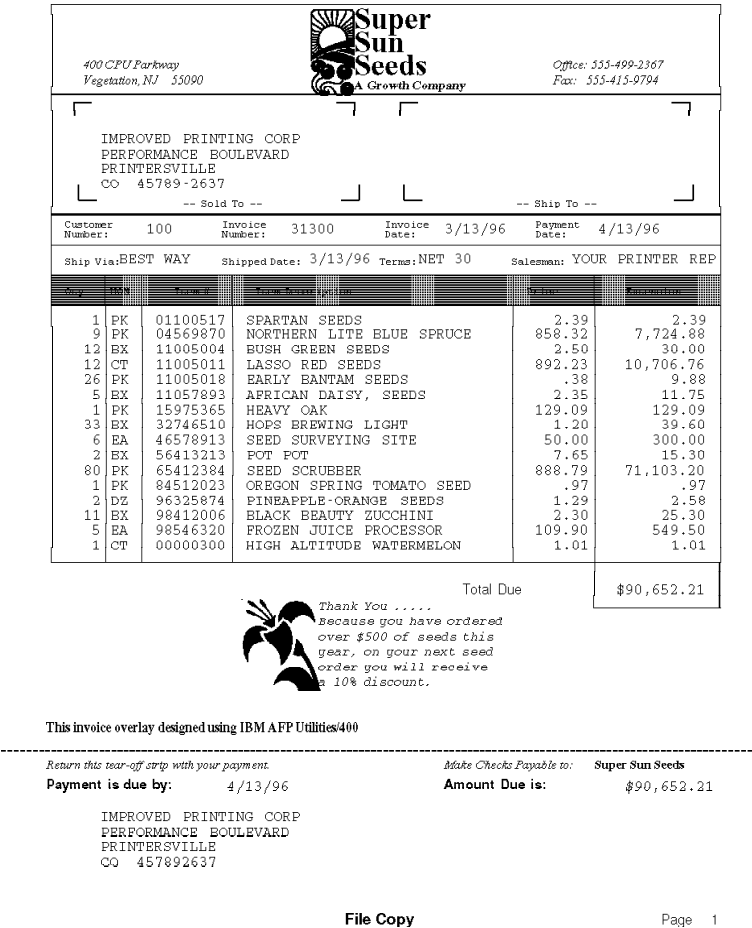


Figure 70. Super Sun Seeds Invoice as Floating Document

Similarly, you can float other elements of the document. For example, instead of placing the variable page segment at a fixed position, you can float it to where you want it to appear on the invoice, then the frame can be dynamically closed.

Positioning

AFP provides the capability to precisely position any document element anywhere on the page. You can also position information in any sequence. Traditional SCS output uses row and column positioning, working sequentially down the page. DDS supports both methods of positioning information. For many output applications (including the Super Sun Seeds invoicing example), row and column positioning is still a good approach. With the example, the use of absolute positioning is minimized (absolute positioning uses down and across parameters, or the POSITION keyword).

One aid to positioning is a “grid” overlay, shown in Figure 71. This grid can be printed with the raw invoicing data. It can be a very effective tool in building your electronic output. In the example, the grid would match the spacing of the application: 6 lines to the inch for rows, 10 characters per inch for columns.

[illegible]

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Chapter 12. Using the Advanced Print Utility

Advanced Print Utility (APU), a part of the AFP PrintSuite family of application enablers, is an end-user utility for transforming existing application output to advanced electronic documents. APU enables you to transform new and existing applications with line-mode output and preprinted forms to full-function electronic documents without changes to the “line of business” application program.

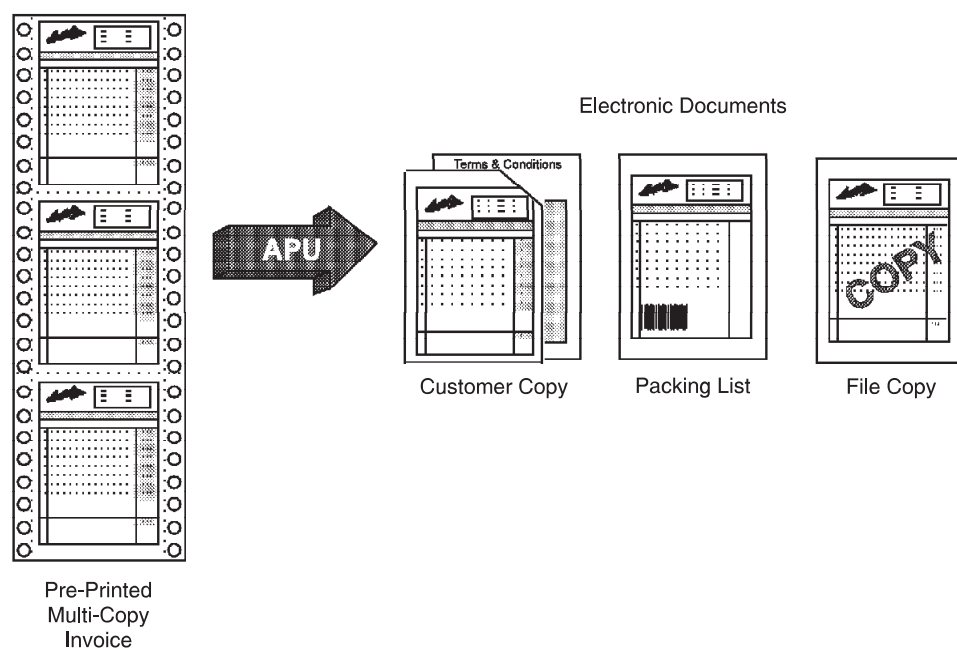


Figure 72. Typical Advanced Print Utility Application

Figure 72 shows a typical example with invoices. With APU, you can use data that produces multi-copy preprinted invoices as input to create electronic pages with customized copies.

APU, designed to build complex documents, has a simple end-user interface; documents can include such elements as multiple page formats, multiple copies, and standard back overlays. APU provides application data remapping, enabling you to completely change the way the application data is printed. APU also provides output conditional processing, where data in the existing spooled output is used to determine document layout and flow.

Figure 73 on page 162 illustrates the APU print flow.

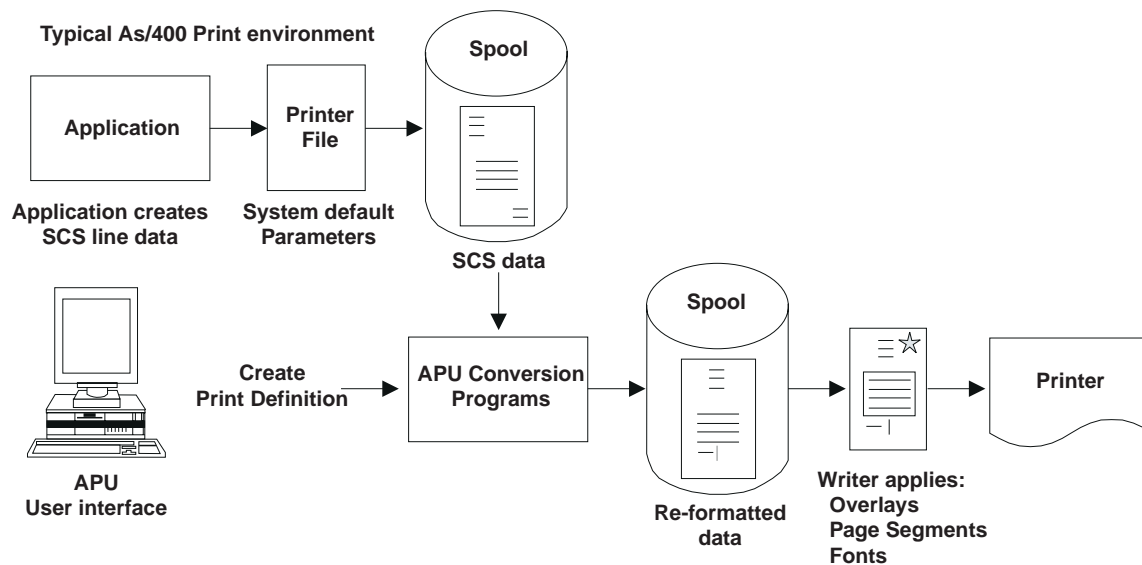


Figure 73. APU Print Flow

Figure 73 shows the APU application flow. APU has a design phase and a production phase. During the design phase (which is done one time), the new electronic application is designed. This design process includes retrieving a sample spooled SCS file and displaying it for use. The user can then create a print definition, which can define conditional logic, redefine data on the page, change fonts, and specify overlays, page segments, and bar codes.

After the new design is ready, you can use the APU Print Monitor or the Apply Print Definition command (APYPRTDEF) to apply the Print Definition to the target SCS spooled file to create the new output. The new output is requeued to the spool. At this point, PSF/400 takes over, retrieves required external print resources, and manages the printing of the job.

What You Can Do with APU

Output specifications for AS/400 application programs generate either SNA Character Stream (SCS) or AFP spooled files. APU works on SCS spooled files. SCS is a line-oriented datastream that for the most part uses preprinted forms to create the final document. With APU, you can eliminate the need for preprinted forms. Instead, you create a completely electronic document. With APU, you can:

- Create multi-copy documents, with each page customized
- Use data that is contained within a page to determine which of multiple output formats to use
- Remap any field that the input SCS pages contain (change position, font, orientation, color, and so on)
- Print application data in any of the standard bar code symbologies
- Add document elements such as electronic forms (overlays), images, lines, boxes, and constant text
- Place a new application into production for automatic processing
- Manage the production of input and output files, including the routing of different output files to different queues, printers, and output bins

- Implement user-defined programs that can address unique document or document distribution requirements

APU provides an interactive interface for defining new output applications. For simpler applications, APU provides a “fast path”. You use the current spooled file (SCS) interactively to redefine the formatting of application data.

Why Use APU?

APU assists you in building AFP-compatible electronic output. Effective electronic output can provide significant benefits to an organization, particularly in the areas of information systems costs, process reengineering, and better communications, for example:

- Replacing preprinted multipart forms with electronic forms supplies significant cost savings.
 - You can print a variety of different forms one after the other without switching forms at the printer.
 - You can eliminate carbon forms by printing multiple copies of the same page, that includes the capability of varying the output on each copy.
 - You can eliminate storage space for preprinted forms because the forms are stored electronically rather than physically occupying office space.
 - You can change the form outside of the application program, and you do not need to scrap or reorder preprinted forms.
- Documents, whether printed, stored, or viewed, are critical to the workflow in any organization. The capabilities of electronic documents provide a wealth of opportunities to reengineer organizational processes. In fact, in many industries, document reengineering such as bar coding is a “must.” Coding an electronic document with bar code, optical character recognition (OCR), magnetic ink character recognition (MICR), and images enables you to easily integrate the document into the workflow.
- Electronic documents are more effective documents. Document elements, such as images, text, and overlays, allow you to compose a document that does a better job of communicating or marketing. Electronic flexibility, the ability to change a document dynamically down to the individual transaction level, provides a wide variety of application possibilities. Electronic documents project the image of a strong, professional organization.

Data Mapping and Field Selection

APU enables you to select a target spooled file and bring that file into the user definition flow for spool data remapping and field selection. This sample spooled file is brought up in Non-Programmable Terminal (NPT) mode and enables you to:

- Select and define fields for remapping, including:
 - Changing position, font, color, or rotation of field
 - Printing the field separately as bar code
 - Suppressing the printing of a field
- Select and name fields to be used with conditional logic to select and control the page layout

APU Data Structure

APU redefines the output structure by creating a print definition that contains page formats, as well as copy and page layout information. Figure 74 shows this structure.

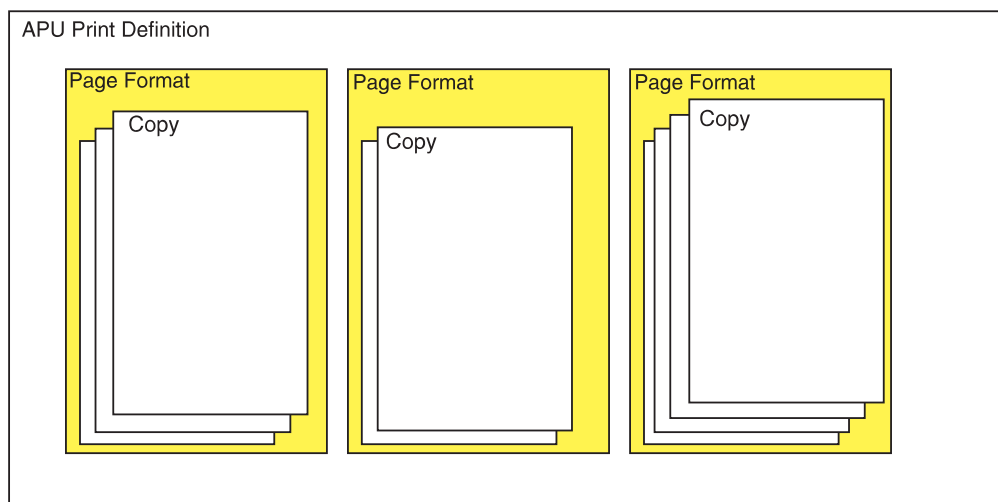


Figure 74. APU Data Structure

The structure is as follows:

Print Definition

The object that contains all of the instructions for formatting a print job. A print definition can contain one or more page formats. A print definition with one page format is considered a “fast-path” definition.

If multiple page formats are specified, the print definition also specifies the conditions under which each page format is selected. The conditions are defined in the form of tests on fields of data in the existing output that you can specify. For example, you can specify that columns 1-5 in row 1 of the existing output data contain a “trigger” field to be analyzed. If that field is *JOB 1*, then the page format INVOICE is to be used. If that field is *JOB 2* then the page format SHIPPING is to be used.

Page Format

The level within a print definition that contains all of the instructions for processing each input page that meets a certain set of criteria. A page format can contain one or more copies.

Copy The level within a page format that contains all of the instructions for formatting a single output page for a single input data page. Using multiple copies, APU can produce multiple pages from a single input page, with each output page having different characteristics (customer copy, file copy, and so on).

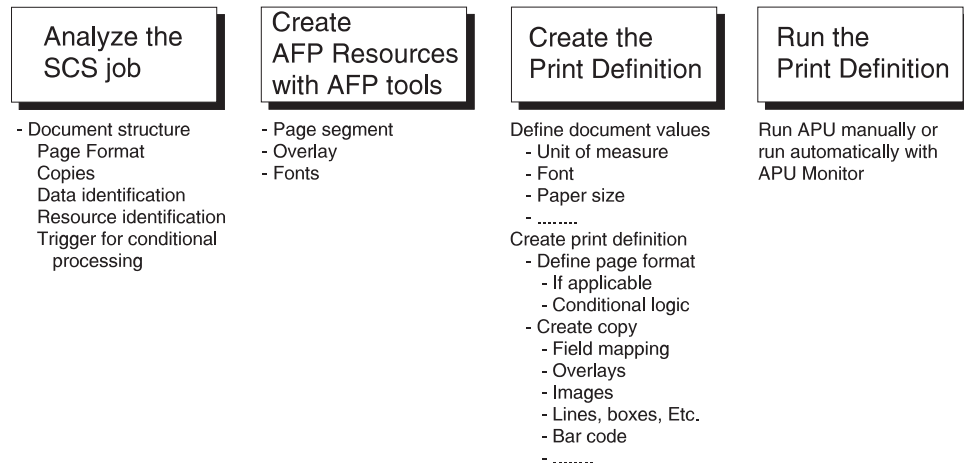


Figure 75. APU Step by Step

Figure 75 shows a step-by-step view of APU.

- Analyze the current SCS job. Determine what the new document structure and layout will be, what triggers exist for conditional processing, what resources will be required.
- Create the required resources. With AFP Utilities, you can print the existing SCS file with a row/col grid overlay to plan out data mapping and electronic form layout.
- Build the APU print definition. This design process flows with the new document structure. The general steps include:
 - Set overall document values
 - Define each page format, and within that . . .
 - Define each copy
 - Go to the next page format (if more than one)
- Run the Print Definition. After you have completed the design, you can run APU either manually (to test, for example) or start the APU Print Monitor for automatic operation.

Example of a Single-Page Format Document

Following are two illustrations.

- “Example of the SCS File to be Formatted” shows the SCS file to be transformed by APU
- “Example of the Formatted File” on page 166 shows the same file after it has been transformed into an AFP file by APU

Example of the SCS File to be Formatted

IMPROVED PRINTING CORP				SAME	
PERFORMANCE BOULEVARD					
PRINTERSVILLE					
CO 45789-2637					
100	31300	1/26/98	2/26/98		
BEST WAY	1/26/98	NET 30	YOUR PRINTER REP		
1 CT	00000300	HIGH ALTITUDE WATERMELON	1.01	1.01	
1 PK	01100517	SPARTAN SEEDS	2.39	2.39	

9	PK	04569870	NORTHERN LITE BLUE SPRUCE	858.32	7,724.88
12	BX	11005004	BUSH GREEN SEEDS	2.50	30.00
12	CT	11005011	LAZZO RED SEEDS	892.23	10,706.76
26	PK	11005018	EARLY BANTAM SEEDS	.38	9.88
5	BX	11057893	AFRICAN DAISY, SEEDS	2.35	11.75
1	PK	15975365	HEAVY OAK	129.09	129.09
33	BX	32746510	HOPS BREWING LIGHT	1.20	39.60
6	EA	46578913	SEED SURVEYING SITE	50.00	300.00
2	BX	56413213	POT POT	7.65	15.30
80	PK	65412384	SEED SCRUBBER	888.79	71,103.20
1	PK	84512023	OREGON SPRING TOMATO SEED	.97	.97
2	DZ	96325874	PINEAPPLE-ORANGE SEEDS	1.29	2.58
11	BX	98412006	BLACK BEAUTY ZUCCHINI	2.30	25.30
5	EA	98546320	FROZEN JUICE PROCESSOR	109.90	549.50

Thank You
 Because you have ordered
 over \$500 of seeds this
 year, on your next seed
 order you will receive
 a 10% discount.

\$90,652.21

2/26/98
 IMPROVED PRINTING CORP
 PERFORMANCE BOULEVARD
 PRINTERSVILLE
 CO 457892637

\$90,652.21

Example of the Formatted File

The formatted output that you want to produce is shown in Figure 76 on page 167.



400 CPU Parkway Vegetation, NJ 55090		 Super Sun Seeds A Growth Company		Office: 555-499-2367 Fax: 555-415-9794	
IMPROVED PRINTING CORP PERFORMANCE BOULEVARD PRINTERSVILLE CO 45789-2637				SAME	
-- Sold To --				-- Ship To --	
Customer Number:	100	Invoice Number:	31300	Invoice Date:	1/22/98
				Payment Date:	2/22/98
Ship Via: BEST WAY Shipped Date: 1/22/98 Terms: NET 30 Salesman: YOUR PRINTER REP					
Qty	UOM	Item	Item Description	Price	Extension
1	CT	00000300	HIGH ALTITUDE WATERMELON	1.01	1.01
1	PK	01100517	SPARTAN SEEDS	2.39	2.39
9	PK	04569870	NORTHERN LITE BLUE SPRUCE	858.32	7,724.88
12	BX	11005004	BUSH GREEN SEEDS	2.50	30.00
12	CT	11005011	LASSO RED SEEDS	892.23	10,706.76
26	PK	11005018	EARLY BANTAM SEEDS	.38	9.88
5	BX	11057893	AFRICAN DAISY, SEEDS	2.35	11.75
1	PK	15975365	HEAVY OAK	129.09	129.09
33	BX	32746510	HOPS BREWING LIGHT	1.20	39.60
6	EA	46578913	SEED SURVEYING SITE	50.00	300.00
2	BX	56413213	POT POT	7.65	15.30
80	PK	65412384	SEED SCRUBBER	888.79	71,103.20
1	PK	84512023	OREGON SPRING TOMATO SEED	.97	.97
2	DZ	96325874	PINEAPPLE-ORANGE SEEDS	1.29	2.58
11	BX	98412006	BLACK BEAUTY ZUCCHINI	2.30	25.30
5	EA	98546320	FROZEN JUICE PROCESSOR	109.90	549.50
Thank You Because you have ordered over \$500 of seeds this year, on your next seed order you will receive a 10% discount.					
Total Due					\$90,652.21
Return this tear-off strip with your payment. Make Checks Payable to: Super Sun Seeds Payment is due by: 2/22/98 Amount Due is: \$90,652.21					
IMPROVED PRINTING CORP PERFORMANCE BOULEVARD PRINTERSVILLE CO 457892637					Page 1

Figure 76. Super Sun Seeds Invoice

Refer to AS/400 Advanced Print Utility User's Guide for more information on Advanced Print Utility.

Super Sun Seeds Case Study

The APU example of the Super Sun Seeds case study is a simple, straightforward application. As shown in "Chapter 5. Introduction to the Super Sun Seeds Case Study" on page 43, the existing Super Sun Seeds invoicing application is a preprinted invoice produced by program INVPRE. APU is used to transform the output of INVPRE to a multi-copy electronic invoice.

To do this, an APU print definition (SUPER) is built that will:

- Specify only one page format, the basic invoice page
- Select a sample spooled file (from INVPRE)
- Automatically create the original copy (*ORIGINAL)
- Define the composition of the original or customer copy, as follows:
 - Specify general page layout options, including the constant terms and conditions back overlay
 - Map data in the spooled file, such as the zip code to POSTNET bar code
 - Write "Customer Copy" at bottom on copy
 - Place INVALL overlay on front

- Define two additional copies, the packing list and file copies, by first copying the definition of the *ORIGINAL
- Modify the packing list copy, suppressing pricing information and printing “Packing List” as constant text
- Modify the file copy, printing “File Copy” at the bottom

Stepping through the following APU displays can help you to understand how the definition process works. Starting from the Advanced Print Utility main menu, select option “1” to create a print definition.

```

APU                                IBM Advanced Print Utility

Select one of the following:

  Build and Test APU Print Definitions
    1. Work with Print Definitions
    2. Work with Spooled Files

  Run APU in Batch Mode
    3. Work with APU Monitor
    4. Start APU Monitor
    5. End APU Monitor

  Configure APU
    6. Set APU Defaults
    7. Work with Fonts
    8. Configure APU Monitor Action

Selection or command
==> 1
F3=Exit   F4=Prompt   F9=Retrieve   F12=Cancel   F16=System main menu
F23=Set initial menu

```

Figure 77. APU Main Display

Other functions you can select from the main menu include:

- Working with output queues, applying APU print definitions to selected spooled files
- Managing the APU Monitor, which automatically selects target spooled files and transforms them with an APU print definition
- Setting the APU defaults, which includes measurement method, libraries, and code page
- Working with fonts, which maintains the interface to the fonts used on the system

From the “Work with Print Definitions” display, create a print definition called SUPER. Define SUPER as a print definition with a single page format.

```

Work with Print Definitions

Library . . . . . APUDATA          Name, *CURLIB

Type options, press Enter.
  1=Create  2=Change  3=Copy  4=Delete  5=Display contents
  6=Print contents  7=Rename  10=Define  12=Work with

Opt  Name      Text
    APU1      APU Screen demo
  10  SUPER      Super Sun Seeds Invoice

Bottom

F3=Exit  F5=Refresh  F12=Cancel

```

Figure 78. Work with Print Definitions Display

When you select option “10” (Define), the “Define a Print Definition” display appears. Select the “Set print definition attributes” option to set attributes for the SUPER print definition.

```

Set Print Definition Attributes

Print Definition . . . : SUPER
Library . . . . . : APUDATA

Type choices, press Enter.

Unit of Measure . . . . *INCH          *INCH, *CM, *ROWCOL, *UNITS
Default line increment *INPUT *INCH      *INPUT, Value
Default column inc. . . *INPUT *INCH      *INPUT, Value
Page length . . . . . 11 *INCH          *INPUT, Value
Page width . . . . . 8.5 *INCH          *INPUT, Value
Top margin (down) . . . 0 *INCH          0, Value
Left margin (across) . . 0 *INCH          0, Value
Page orientation . . . 0 *INCH          0, 90, 180, 270
Apply field attributes 1=Yes

More...

F3=Exit  F12=Cancel  F22=Set Units

```

Figure 79. Print Definition Attributes (First display)

The print definition attributes include page characteristics, the default font family, and resource libraries.

Note: Type **INPUT* if you want to use the value contained in the input spooled file.

```

Set Print Definition Attributes

Print Definition . . . : SUPER
Library . . . . . : APUDATA

Type choices, press Enter.

Default font family . . *APUDFT          *APUDFT, Value   F4 for List
Point size . . . . . *CALC              *CALC, Value
Bold . . . . .          1=Yes
Italic . . . . .          1=Yes
Default Color . . . . . *APUDFT          *APUDFT, Value   F4 for List
Addl. resource libs. .  QGPL              Name
                                      Name
                                      Name
                                      Name
                                      Bottom

F3=Exit   F4=Prompt   F12=Cancel

```

Figure 80. Print Definition Attributes (Second display)

After you have defined these print definition attributes and pressed Enter, the “Work with Print Definitions” display appears again.

Note: If you specify *CALC, the point size is determined by the value specified in the input spooled file.

```

Work with Print Definitions

Library . . . . . APUDATA          Name, *CURLIB

Type options, press Enter.
 1=Create  2=Change  3=Copy  4=Delete  5=Display contents
 6=Print contents  7=Rename 10=Define 12=Work with

Opt  Name      Text
12  APU1       APU Screen demo
    SUPER      Super Sun Seeds Invoice

Bottom

F3=Exit   F5=Refresh   F12=Cancel

```

Figure 81. Work with Print Definitions Display

Select option “12” to display the “Work with Copies” display. On this display you can define the first copy.

Work with Copies		
Print Definition . . . :	SUPER	Page Format : *DEFAULT
Library :	APUDATA	
Type options, press Enter.		
1=Create	2=Change	3=Copy 4=Delete 7=Rename
10=Define		
Opt	Name	Text
10	*ORIGINAL	Original (first copy)
		Bottom
F3=Exit	F5=Refresh	F12=Cancel

Figure 82. Work with Copies Display

The first copy (*ORIGINAL) of the print definition is automatically created. This first copy will be the “Customer Copy” of the Super Sun Seeds invoice. Select option “10” to define the page layout of this copy.

Define a Copy		
Print Definition . . . :	SUPER	Page Format : *DEFAULT
Library :	APUDATA	Copy : *ORIGINAL
Type options, press Enter.		
1=Select		
Opt	Function	
1	Select a sample spooled file	
1	Set page layout options	
1	Define field mapping	
1	Define constants	
	Define boxes	
	Define page segments	
1	Define overlays	
F3=Exit	F12=Cancel	

Figure 83. Define a Copy Display

The “Define a Copy” display shows the composition elements that you can define for this copy. Select a sample spooled file, set the general page layout options, define field mapping, place constant text, and place the front overlay. Then press Enter. The “Select a Sample Spooled File” display appears.

Figure 84. Select a Sample Spooled File Display

Figure 85. Set Page Layout Options Display

- Input drawer for this page to be drawn from
- Line and column increments for this page, such as 6 lines per inch for line and 10 characters per inch for column
- Page length and width; in this example, 8-1/2 by 11 inches

- Page margins and orientation; in this example, all zero

Many of these values default to *PRTDEF, which points to values set for this print definition. However, these values can also be different, which means that an individual copy can have different orientation, margins, input selections, and other characteristics.

Specify the Terms and Conditions overlay (INVBAC) as the back overlay. That overlay is shown below:

Terms and Conditions

The sale of the products described herein shall be governed by the terms and conditions contained in any written contract currently in effect between Buyer and Seller covering such sale. If there is no such contract, then Seller hereby offers to sell such products to Buyer only upon the terms set forth herein.

1. *Seller's standard prices in effect at the time of shipment will govern the sale of the products described herein. Terms of payment on any approved order are net thirty (30) days from the date of invoice unless otherwise specifically stated. All shipments, unless specifically provided, shall be f.o.b. place of manufacture or warehouse location indicated hereon. The price includes cost of packaging for domestic shipment, unless otherwise stated. An additional charge will be made for special domestic or export packing if this involves greater expense. Shipments will be insured at the expense of the Buyer unless Buyer specifically requests that shipments not be insured.*
2. *Seller reserves the right among other remedies self to terminate this contract or suspend further deliveries under it in the event Buyer fails to pay for any one shipment when same becomes due. Should Buyer's financial responsibility become unsatisfactory to Seller, cash payments or satisfactory security may be required by Seller for future deliveries and for goods then to be delivered.*
3. *In addition to the purchase price, Buyer shall pay the Seller the amount of all taxes, excises or other charges (except taxes on or measured by net income) that Seller may be required to pay to any Government (national, state or local) with respect to the production, sale or transportation of any product delivered hereunder, except where the law otherwise provides. Sixty (60) days written notification must be given to make any change to delivery schedule.*
4. *Seller warrants that products delivered hereunder will conform to the description on the face of this document and meet any specifications set forth or incorporated by reference herein and will be adequately contained, packaged and labeled and conform to any promises and affirmations of fact made on the container and label. Seller further warrants any such product against defects in workmanship or materials which develop or become evident within 12 (6 months OEM) after shipment of the product by Seller provided Seller's responsibility under this warranty shall be limited to the repair or if Seller so elects the replacement of the defective product or component thereof and that said warranty is subject to the following exceptions and conditions:*
 - (a) *All items claimed to be defective must be returned to Seller; transportation charges prepaid and will be returned to Buyer; transportation charges collect unless found to be defective in which case Seller will pay all transportation charges.*
 - (b) *Seller's warranty will not apply to items which have been modified or repaired without Seller's written consent by persons other than Seller's authorized service personnel.*
5. *It should be noted that Seller has used the powerful tools of AS400 Advanced Function Printing to create Seller's invoice, and despite the arcane terms and conditions which are presently being read, the invoice is a very effective business document. Any attempt to mar the appearance of this invoice should be discouraged.*
6. *The validity, interpretation and performance of the terms hereof with respect to any product delivered (or to be delivered) hereunder shall be governed by the law of the State of Colorado...*
7. *No modification or waiver of the terms here of shall be binding upon Seller unless approved in writing by one of Seller's Officers or Marketing Managers or shall be affected by acknowledgment or acceptance of purchase order forms containing other or different terms whether or not signed by authorized representative of Seller. (a) Seller does not warrant items which have been damaged due to negligence or misuse.*
8. *THERE ARE NO EXPRESS WARRANTIES BY SELLER OTHER THAN THOSE SPECIFIED IN THIS PARAGRAPH. NO WARRANTIES BY SELLER (OTHER THAN WARRANTY OF TITLE AS PROVIDED IN THE UNIFORM COMMERCIAL CODE) SHALL BE IMPLIED OR OTHERWISE CREATED UNDER THE UNIFORM COMMERCIAL CODE, INCLUDING BUT NOT LIMITED TO WARRANTY OF MERCHANTABILITY IN OTHER RESPECTS THAN SPECIFIED IN THIS PARAGRAPH AND WARRANTY OF FITNESS FOR A PARTICULAR PURPOSE. Without limiting the generality of the foregoing, Buyer assumes all risk and liability for the results obtained by the use of any products delivered hereunder in combination with other articles or material in the practice of any process.*
9. *NO CLAIM of any kind with respect to any product specified herein, whether as to product delivered or for nondelivery of product and whether or not based on negligence, SHALL BE GREATER IN AMOUNT than the purchase price of the product in respect of which such claim is made. In no event shall either party be liable for special indirect or consequential damages whether or not caused by or resulting from the negligence of such party.*
10. *It is expressly understood that any technical advice furnished by Seller with reference to the use of its products is given gratis and Seller assumes no obligation of liability for the advice given or results obtained, all such advice being given and accepted at Buyer's risk.*
11. *In the event Buyer fails to fulfill Seller's terms of payment for the products specified herein, or in case Seller shall have any doubt at any time as to Buyer's financial responsibility, Seller may decline to make further deliveries except upon receipt of cash or satisfactory security.*

Figure 86. Back Overlay (Terms and Conditions) - INVBAC

This figure shows what is described in the text. Please refer to the printed publication to see this figure.

After you have specified the Terms and Conditions overlay, you will then need to define field mapping for your output. Select the "Define field mapping" option on the "Define a Copy" display and press Enter. The "Define Field Mapping" display, shown below, appears.

Define Field Mapping			
Spooled file	INVPRE	Page/Line	1/1
Control		Columns	1 - 78
*...+...1...+...2...+...3...+...4...+...5...+...6...+...7...+...			
IMPROVED PRINTING CORP		SAME	
PERFORMANCE BOULEVARD			
PRINTERSVILLE			
CO 45789-2637			
		More...	
F3=Exit	F11=Hide mapping	F12=Cancel	F14=Start field
F15=End field	F16=Delete range		F20=Right

Figure 87. Define Field Mapping Display

APU displays the Super Sun Seeds invoice spooled file for data mapping. With data mapping, you can redefine how the application data is placed on output, including:

- Moving fields to new locations
- Changing how fields are printed, such as font and color
- Printing fields as bar code
- Suppressing fields from printing

Define Field Mapping			
Spooled file	INVPRE	Page/Line	1/1
Control		Columns	1 - 78
*...+...1...+...2...+...3...+...4...+...5...+...6...+...7...+...			
IMPROVED PRINTING CORP		SAME	
PERFORMANCE BOULEVARD			
PRINTERSVILLE			
CO 11111111			
		More...	
F3=Exit	F11=Hide mapping	F12=Cancel	F14=Start field
F15=End field	F16=Delete range		F20=Right
Bar code at 15/16 created			

Figure 88. Define Field Mapping Display

To reprint the zip code in the name and address in POSTNET bar code, you first define the zip code field to APU. Use F14 to specify the beginning of the field and F15 to specify the end of the field.

Select what you want to do with the zip code field. In this case, map it as bar code.

Note: To successfully print your POSTNET bar code mapping, you must specify the correct number of digits (5 or 9, for example) for the type of POSTNET bar code you selected. If you do not map enough numeric digits, question marks (?) appear in the “Bar code data” field to indicate that you need to map the correct number of digits. If you do not map the correct number of digits, your bar code will not print.

Note that non-numeric characters, such as the dash contained in the ZIP + 4 code, are removed for you.


```

: ..... Map Bar Code .....
:
: Type choices, press Enter.
:
: From Row / Column : 15 / 16
: Bar code data . . : 457892637
:
: Position across . . 1.25 *INCH Value
: Position down . . . 1.90 *INCH Value
:
: Rotation . . . . . *DEFAULT *DEFAULT, 0, 90, 180, 270
: Color . . . . . *PRTDEF *PRTDEF, Value F4 for list
:
: Bar code type . . . 12 Value F4 for list
:
:
:
:
: F4=Prompt F12=Cancel More...
: F22=Set Units
:
: .....

```

Figure 89. Map Bar Code Display

The “Map Bar Code” display is a multi-screen pop-up used to select, define, and position the bar code. The zip code is at row 15, column 16, and the value is shown. Map it (make a copy of the zip code) in bar code to a position starting at 1.25 inches down and 1.90 inches across the paper. It could have also been positioned by row and column. In either case, it will appear just above the name and address. Position the cursor in the “Bar code type” field and press F4 to display a list of supported bar code types. Select “12”, which is POSTNET. Press Enter to return to the “Define Field Mapping” display. Press F3. The “Define Constants” display appears.

```

Define Constants

Print Definition . . : SUPER          Page Format . . . . : *DEFAULT
Library . . . . . : APUDATA        Copy . . . . . : *ORIGINAL

Type options, press Enter.
  1=Create  2=Change  3=Copy  4=Delete
   Constant Position Position Unit of

Opt type   across   down    measure Constant value
1  *TEXT

F3=Exit  F5=Refresh  F12=Cancel

```

Figure 90. Define Constants Display

Next, define the constant text “Customer Copy” to appear at the bottom of this copy. Specify a text type for this constant. You could also specify a constant bar code. Select option “1” and press Enter. The “Create Constant Text” display appears.

Define Constants			
.....			
: Create Constant Text :			
: :			
: Type choices, press Enter. :			
: :			
: Position across . .	4.0	*INCH	Value
: Position down . . .	10.8	*INCH	Value
: Constant value . .	Customer Copy		
: :			
: :			
: Font	*PRTDEF	*PRTDEF, Value F4 for list	
: Point size . . .		*CALC, Value	
: Bold		1=Yes	
: Italic		1=Yes	
: Rotation	*DEFAULT	*DEFAULT, 0, 90, 180, 270	
: Color	*PRTDEF	*PRTDEF, Value F4 for list	
: :			
: F4=Prompt F12=Cancel F22=Set Units :			
: :			
:			

Figure 91. Create Constant Text Display

Specify the text “Customer Copy” and position it 10.8 inches down, and 4 inches across the paper. Again, you could specify the positioning by row and column.

Position the cursor in the “Font” field, and press F4. The font database appears. For this example, select a Helvetica, 10-point, bold font as shown in the following display.

Define Constants			
.....			
: Select a Font :			
: :			
: Font family	HELVETICA	Name, Generic*, *ALL	
: Point size	*ALL	Value, *ALL	
: Bold		1=Yes, 0=No	
: Italic		1=Yes, 0=No	
: :			
: Type Options, press Enter. :			
: 1=Select 5=Details :			
: :			
: Opt	Font family	Size	Style
:	:	:	:
: 1	HELVETICA	10	Bold
:	HELVETICA	10	Bold-Italic
:	HELVETICA	11	Normal
:	HELVETICA	11	Italic
:	HELVETICA	11	Bold
:	HELVETICA	11	Bold-Italic
			More...
: F5=Refresh F12=Cancel			
: :			
:			

Figure 92. Select a Font Display

The “Select a Font” is a pop-up display on which you specify a font family. You can type point size and bold and italic selections. Or you can select the font you want

Define Overlays

Print Definition . . . : SUPER Page Format : *DEFAULT
 Library : APUDATA Copy : *ORIGINAL

Type options, press Enter.


1=Create 2=Change 3=Copy 4=Delete

Opt	Position across	Position down	Unit of measure	Overlay
1	0	0	*INCH	INVALL

F3=Exit F5=Refresh F12=Cancel

Figure 95. Define Overlays Display

On the “Define Overlays” display, select the Super Sun Seeds invoice overlay (INVALL) to be printed on this copy. A sample of the INVALL overlay is shown below:

600-100 Parkway Vegetation NJ 55080		 Super Sun Seeds A Growth Company		Phone: 555-489-2567 Fax: 555-413-8784	
-- Sold To --		-- Ship To --			
Customer Number:	Invoice Number:	Invoice Date:	Payment Date:		
Ship Via:	Shipped Date:	Terms:	Salesman:		
Total Due					

This invoice overlay designed using IBM AFP Utilities/400

Return this tear-off strip with your payment. Payment is due by:	Make Checks Payable to: Super Sun Seeds Amount Due is:
--	---

Figure 96. Sample INVALL Overlay

At this point, the composition of the customer copy has been defined, and the “Work with Copies” display appears again.

Work with Copies

Print Definition . . . : SUPER
Library : APUDATA

Page Format : *DEFAULT

Type options, press Enter.
1=Create 2=Change 3=Copy 4=Delete 7=Rename
10=Define

Opt	Name	Text
	*ORIGINAL	Customer Copy

Bottom

F3=Exit
F5=Refresh
F12=Cancel

Figure 97. Work with Copies Display

Select option “3” (copy) to replicate the contents of the customer copy to two additional copies: the packing list and the file copy.

Select option “10” to define these copies, and change the constant text printed at the bottom to “Packing List” and “File Copy”.

Work with Copies

Print Definition . . . : SUPER
Library : APUDATA

Page Format : *DEFAULT

Type options, press Enter.
1=Create 2=Change 3=Copy 4=Delete 7=Rename
10=Define

Opt	Name	Text
	*ORIGINAL	Customer Copy
	FILE	File Copy
	PACKING	Packing List

Bottom

F3=Exit
F5=Refresh
F12=Cancel

Figure 98. Work with Copies Display

In addition, for the packing list, suppress the printing of the prices. This is done on the “Define Field Mapping” display shown below.

Define Field Mapping				
Spooled file		INVPRE	Page/Line : 1/17	
Control			Columns : 1 - 78	
*...+...1...+...2...+...3...+...4...+...5...+...6...+...7...+...				
	100	31300	3/03/96	4/03/96
	BEST WAY	3/03/96	NET 30	YOUR PRINTER RE
1 CT	00000300	HIGH ALTITUDE WATERMELON	100	100
1 PK	01100517	SPARTAN SEEDS	100	100
9 PK	04569870	NORTHERN LITE BLUE SPRUCE	100	900
12 BX	11005004	BUSH GREEN SEEDS	100	1200
12 CT	11005011	LASSO RED SEEDS	100	1200
26 PK	11005018	EARLY BANTAM SEEDS	100	2600
5 BX	11057893	AFRICAN DAISY, SEEDS	100	500
1 PK	15975365	HEAVY OAK	100	100
33 BX	32746510	HOPS BREWING LIGHT	100	3300
More...				
F3=Exit	F11=Hide mapping	F12=Cancel	F14=Start field	
F15=End field	F16=Delete range		F20=Right	

Figure 99. Define Price Suppression for Packing List

To suppress the price information on the packing list copy (PACKING), select option “10” to define the packing list copy and bring up the sample spooled file with the field mapping function. Use F14 and F15 to mark the first field in a column to be suppressed. In this example, the price and extension fields are suppressed from printing.

Define Field Mapping				
Spooled file		INVPRE	Page/Line : 1/17	
Control			Columns : 1 - 78	
*...+...1...+...2...+...3...+...4...+...5...+...6...+...7...+...				
	100	31300	3/03/96	4/03/96
	BEST WAY	3/03/96	NET 30	YOUR PRINTER RE
1 CT	00000300	HIGH ALTITUDE WATERMELON	44444444444444444444444444444444	
1 PK	01100517	SPARTAN SEEDS	44444444444444444444444444444444	
9 PK	04569870	NORTHERN LITE BLUE SPRUCE	44444444444444444444444444444444	
12 BX	11005004	BUSH GREEN SEEDS	44444444444444444444444444444444	
12 CT	11005011	LASSO RED SEEDS	44444444444444444444444444444444	
26 PK	11005018	EARLY BANTAM SEEDS	44444444444444444444444444444444	
5 BX	11057893	AFRICAN DAISY, SEEDS	44444444444444444444444444444444	
1 PK	15975365	HEAVY OAK	44444444444444444444444444444444	
33 BX	32746510	HOPS BREWING LIGHT	44444444444444444444444444444444	
More...				
F3=Exit	F11=Hide mapping	F12=Cancel	F14=Start field	
F15=End field	F16=Delete range		F20=Right	

Figure 100. Define Price Suppression for Packing List

Select the function to repeat the suppression. In this case, because an invoice can contain up to 31 line items on a page, repeat the suppression 30 times for the price field.

Expanded Case Study with APU

The previous APU example used a single page format. The invoice application could easily have been more complex. For instance, many invoicing applications use simple preprinted forms that allow the format of a continuation page to be different from the first page (not unlike what the INVNEW1 example does in the Using DDS chapter). This facilitates, among other things, less heading space and more line items on the continuation pages, as well as a more customized document.

APU handles this more complex application easily. With the page composition different on different pages, the first step is to identify the pages. With APU, you can analyze the sample spooled file, looking for fields that distinguish page one from the continuation pages. The following displays show how this is done.

Define a Print Definition

Print Definition . . . : SUPER2
Library : APUDATA

Type options, press Enter.
1=Select

Opt	Function
	Select a sample spooled file
	Set print definition attributes
1	Define selection fields for page formats
1	Define selection rules for page formats

F3=Exit F12=Cancel

Figure 101. Specifying Field and Rules Selection

Now, having specified on creation that it has multiple page formats, PAGE1 and PAGEN, start the SUPER2 print definition. Because this print definition has multiple page formats, you are prompted to define selection fields and selection rules.

Define Selection Fields	
Spooled file : INVPRE	Page/Line : 1/49
Control	Columns : 1 - 78
*...+...1...+...2...+...3...+...4...+...5...+...6...+...7...+...	
	\$90,691.8
4/03/96	\$90,691.8
IMPROVED PRINTING CORP PERFORMANCE BOULEVARD PRINTERSVILLE CO 45789-2637	
	Page 1
	More...
F3=Exit	F11=Hide fields F12=Cancel
F14=Start field	F15=End field F20=Right
Mark end of field, press F15 or press F12 to cancel	

Figure 102. Defining Selection Fields

The sample spooled file, INVPRE, is displayed. Locate the page number field at the bottom on each invoice, and use F14 and F15 to mark it as a field.

Define Selection Fields	
Spooled file : INVPRE	Page/Line : 1/49
Control	Columns : 1 - 78
*...+...1...+...2...+...3...+...4...+...5...+...6...+...7...+...	
<div style="border: 1px dashed black; padding: 10px; margin: 10px auto; width: 80%;"> <p>Define Selection Field</p> <p>Type choices, press Enter.</p> <p>Starting Row / Column : 63 / 73</p> <p>IMPROVED PRIN : Length 3 Value</p> <p>PERFORMANCE B : Name F.063.073 Name</p> <p>PRINTERSVILLE :</p> <p>CO 45789-263 : F12=Cancel</p> </div>	
	Page 1
	More...
F3=Exit	F11=Hide fields F12=Cancel
F14=Start field	F15=End field F20=Right
Mark end of field, press F15 or press F12 to cancel	

Figure 103. Selection Field Pop-up

A pop-up display shows the selected field, and gives it a default name ("F.063.073").


```

Define Selection Fields
Spooled file . . . . . : INVPRE          Page/Line . . . . . : 1/49
Control . . . . .      :                Columns . . . . . : 1 - 78
*...+...1...+...2...+...3...+...4...+...5...+...6...+...7...+...

: .....
:                               Edit Selection Field
:                               :
:                               :
:                               : Type choices, press Enter.
:                               :
:                               :
:                               : Starting Row / Column : 63 / 73
:                               :
IMPROVED PRIN : Length . . . . . 3      Value
PERFORMANCE B : Name . . . . . PAGENBR   Name
PRINTERSVILLE :
CO 45789-263 : F12=Cancel F16=Delete
:
: .....
:                               Page 000
:                               More...

F3=Exit      F11=Hide fields  F12=Cancel
F14=Start field F15=End field      F20=Right

```

Figure 104. Selection Field Naming

Change the default field name to “PAGENBR” in order for this print definition to be more readable. Note that the number field has changed to “000” indicating that it is a mapped field.

```

: .....
:                               Define a Rule
:                               :
:                               :
:                               : Type choices, press Enter.
:                               :
:                               :
: Rule number . . . . . : 10
:
: Condition 1 . . . . . IF
: Field . . . . . PAGENBR      Name F4 for list
: Test . . . . . *EQ          *EQ, *NE, *GT...
: Field or 'Characters' . ' 1' Value F4 for list
: Action . . . . . *USE        *USE, *OMIT, *GOTO
: Page format or rule . PAGE1 Value F4 for list
:
: Condition 2 . . . . .
: Field . . . . . Name F4 for list
: Test . . . . . *EQ, *NE, *GT...
: Field or 'Characters' . Value F4 for list
: Action . . . . . *USE, *OMIT, *GOTO
: Page format or rule . Value F4 for list
:                               More...
: F4=Prompt F12=Cancel
:
: .....

```

Figure 105. Define Selection Rules for Page 1

Using the “Define a Rule” display, enter the logic for identifying Page 1. If the value of PAGENBR is “1”, then APU will select page format PAGE1.

```
..... Define a Rule .....  
:  
:  
: Type choices, press Enter.  
:  
: Rule number . . . . : 20  
:  
: Condition 1 . . . . IF IF, blank  
: Field . . . . PAGE# Name F4 for list  
: Test . . . . *NE *EQ, *NE, *GT...  
: Field or 'Characters' ' 1' Value F4 for list  
: Action . . . . *USE *USE, *OMIT, *GOTO  
: Page format or rule .. PAGEN Value F4 for list  
:  
: Condition 2 . . . . AND, OR  
: Field . . . . Name F4 for list  
: Test . . . . *EQ, *NE, *GT...  
: Field or 'Characters' Value F4 for list  
: Action . . . . *USE, *OMIT, *GOTO  
: Page format or rule .. Value F4 for list  
:  
:  
: More...  
: F4=Prompt F12=Cancel  
:  
:.....
```

Figure 106. Define Selection Rules for All Other Pages

Enter the logic for identifying pages greater than page one. If the value of PAGENBR is not "1", then APU will select page format PAGEN.

```

Define Selection Rules

Print definition . . . : SUPER2
Library . . . . . : APUDATA

Type options, press Enter.
1=Create 2=Modify 4=Delete

Opt Rule Cond Field Test Field or 'Characters' Act. Page format
or Rule

10 IF PAGE# *EQ ' 1' *USE PAGE1
20 IF PAGE# *NE ' 1' *USE PAGEN

F3=Exit F5=Refresh F12=Cancel F22=Renumbr
Rule 20 changed
Bottom

```

Figure 107. Summary of Selection Rules

APU summarizes the current selection rules for the SUPER2 print definition.

After you have identified the page formats, you can perform the same definition process to define copies. The major difference in defining these two page formats is that they have different front overlays.

Printing with Advanced Print Utility

Once you have completed your APU application design, you are ready to put it into production. For each APU application, you can define:

- How to select the target spooled files
- Which APU print definition to use
- What additional functions, through user exits, might be required
- What output files to create
- Where to route the output files
- How to handle input and work files during and after processing

With this information, the APU production monitor can select the target spooled file when it reaches the output queue, retrieve the APU print definition, invoke the APU print engine to transform the input spooled records into AFP, and manage the disposition of files.

The APU production monitor can be invoked in three ways:

1. Manually associating a print definition with a specific spooled file. For manual printing, you just “apply” your print definition to a specific spooled file. Refer to “Manually Associating a Print Definition with a Spooled File”.
2. Using the Apply Print Definition command, which enables you to imbed an APU printing step within existing application procedures. Refer to “Using the Apply Print Definition Command” on page 188.
3. Using the APU Monitor to automatically identify the sample spooled file and run the conversion programs. This method is described in “Automatic Printing with APU Monitor” on page 188.

Manually Associating a Print Definition with a Spooled File

This process works as follows. Using your print definition, SUNSD1 or INVOICE, select option **2** from the APU Main Menu. The **Work with Spooled Files** panel appears.

Select a Sample Spooled File

Output Queue QYPUOUTQ Name, *ALL F4 for list

Library QAPU Name, *LIBL

User *ALL Name, *CURRENT, *ALL

Type choices, press Enter.

1=Select 5=Display

Opt	File	Nbr	User	User Data	Queue	Sts	Total Pages
	INVPRE	1	PERELMAN		QYPUOUTQ	RDY	7
	INVSCS	2	PERELMAN		QYPUOUTQ	HLD	6

F4=Prompt F5=Refresh F12=Cancel

Bottom

Figure 108. Select Spooled File

You can display selected output queues and spooled files with this option, and then apply a print definition to the spooled file for example, INVSCS.

Panel 1: Apply Print Definition

Apply Print Definition (APYPRTDEF)

Type choices, press Enter.

SCS Spooled File	> INVSCS	Name
Job name	> QPADEV0016	Name, *
User	> JOHN	Name
Number	> 098677	000000-999999
SCS Spooled file number	> 10	1-9999, *ONLY, *LAST
Print Definition	> INVOICE	Name, *NONE, *SPOOLFILE
Library name	> QAPU	Name, *PRTDEFLIB, *LIBL
Run option	*NORMAL	*NORMAL, *NOCOPY, *REPRINT
Post processing SUCCESS:		
SCS Spooled File	> *NONE	*HOLD, *NONE, *DELETE, *OUTQ
Output queue		Name
Library name		Name, *LIBL
Post processing FAILURE:		
SCS Spooled File	> *NONE	*HOLD, *NONE, *DELETE, *OUTQ
Output queue		Name
Library name		Name, *LIBL

More...

F3=Exit F4=Prompt F5=Refresh F12=Cancel F13=How to use this display
F24=More keys

Figure 109. Apply Print Definition panel

APU will move the input spooled file to the output queue defined in the Success or Failure fields, depending on the result, and will place the file in one of the four status conditions shown above. *HOLD is the default for both success and failure.

Some of the fields you should fill out include:

Input Spooled File

Name of the input spooled (SCS) file to which a print definition is to be applied.

Print Definition

Name of the print definition to be applied to the spooled file.

Success or Failure

Specify what you want to happen to the input spooled file on success or failure.

Press the “Page Down” key to access the next panel.

Note: INVSCS can also be used with the SUPER and SUPER2 print definition samples that are in the QAPU library. INVPRE can be used with the AMASTER print definition, that is also in the QAPU library.

Panel 2: Apply Print Definition

```

Apply Print Definition (APYPRTDEF)
Type choices, press Enter.
User exit BEFORE:
  Program . . . . . *NONE      Name, *NONE
  Library Name . . . . .      Name, *LIBL
  User parameter . . . . .
User exit MIDDLE:
  Program . . . . . *NONE      Name, *NONE
  Library Name . . . . .      Name, *LIBL
  User parameter . . . . .
Device Name . . . . . *JOB      Name, *JOB
Output queue . . . . . *SPOOLFILE Name, *DEV, *SPOOLFILE
  Library Name . . . . .      Name, *LIBL
Spooled file name . . . . . *SPOOLFILE Name, *SPOOLFILE, *PRTDEF
User data . . . . . *SPOOLFILE Character value...
Form type . . . . . *SPOOLFILE Character value...
Hold spooled file . . . . . *NO    *NO, *YES
Save spooled file . . . . . *NO    *NO, *YES, *SPOOLFILE
                                          More...
F3=Exit  F4=Prompt  F5=Refresh  F12=Cancel  F13=How to use this display
F24=More keys

```

Figure 110. Apply Print Definition panel

Make the entries you want. Press **F1** for descriptions of the fields. Here is a description of some of the key fields:

User exit BEFORE

Initializes the name of a program you want run before processing.

User exit MIDDLE

Name of a program you want to be run **after** the input spooled file has been copied to the input spool database.

Device name

Name of the printer on which the output is to be printed.

Output Queue

Name of the queue for the output file.

Spooled file name

Name to be given to the output.

User data

A user-defined parameter in the form of a character string to be placed on the output.

Hold or Save

Specify what you want done with the spooled file after it is processed.

Panel 3: Apply Print Definition

```
Apply Print Definition (APYPRTDEF)
Type choices, press Enter.
Output bin . . . . . *SPOOLFILE 1-65536, *SPOOLFILE, *DEV
User exit AFTER:
  Program . . . . . *NONE      Name, *NONE
  Library Name . . . . .      Name, *LIBL
  User parameter . . . . .
Bottom
F3=Exit  F4=Prompt  F5=Refresh  F12=Cancel  F13=How to use this display
F24=More keys
```

Figure 111. Apply Print Definition panel

Make the entries you want. Press **F1** for descriptions of the fields. Key field entries here are:

Output bin

Where the output is to be placed.

User exit AFTER

Name of a program you want to be run **after** the AFPDS output spooled file has been created.

Using the Apply Print Definition Command

One method of starting APU is to use the Apply Print Definition (APYPRTDEF) command. This is the same command that is called when you manually apply a print definition to a spooled file, working from the “Work with Spooled Files” option that is described in “Manually Associating a Print Definition with a Spooled File” on page 185.

To use the apply print definition command, place the command within existing application procedures, such as a CL (Control Language) program. An example of the command is shown below:

```
APYPRTDEF FILE(INVSCS) JOB(098677/JOHN/QPADEV0016) SPLNBR(10)+
PRTDEF(QAPU/INVOICE) SUCCESS(*NONE) FAILURE(*NONE) DEV(PRT3130)
```

This command selects the INVSCS spooled file from the currently running job (either batch or interactive) and starts APU printing, using the INVOICE print definition. The new AFP output is sent to the output queue that is associated with the PRT3130 printer device.

Note: The APYPRTDEF command can also be used to run in batch.

Automatic Printing with APU Monitor

This section describes the third method of printing APU print definitions. (The other two methods are described in “Printing with Advanced Print Utility” on page 185.)

To give you an understanding of the operation of the APU Monitor, the following topics are described here:

- “Understanding How the APU Monitor Works” on page 189

- “An Example of APU Monitor Processing” on page 190

Understanding How the APU Monitor Works

In the APU Monitor, you can specify values for the parameters that govern APU Monitor processing. These parameters are grouped together and called an “Action”.

There are three “Action” groups in the new APU Monitor. The Monitor processes these actions in the following sequence:

- Selection for input spooled file
- Action for input spooled file
- Action for output spooled file

Note: If an action group contains more than one action, the actions are processed in the order in which they are defined.

Figure 112 diagrams the sequence in which the APU Monitor processes the action groups.

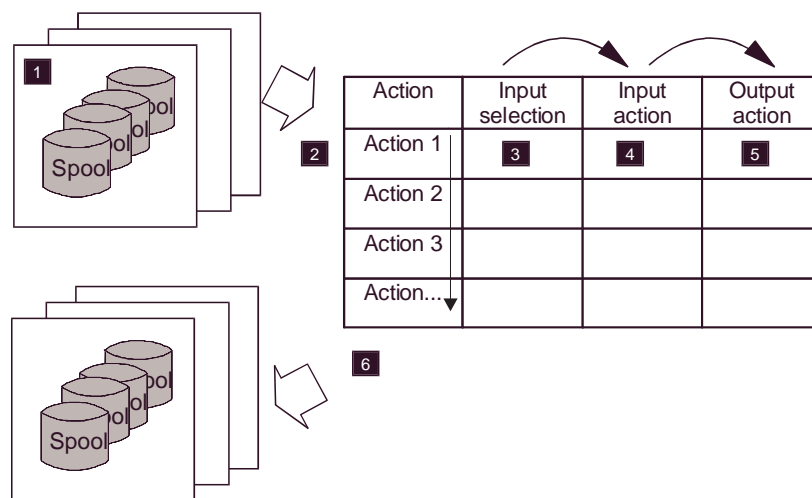


Figure 112. APU Monitor Processing Sequence

Here is an explanation of the steps shown in the diagram:

1. The monitor is invoked each time a spooled file arrives in a monitored output queue or if the spooled file status from a spool in a monitored queue changes to *RDY. Spooled files with other status conditions are not processed.
2. The monitor checks the input selection from each action rule in a sequential manner.
3. As soon as a spooled file matches the action input selection, the input and output action are performed. Subsequent actions are ignored.
4. The input action is applied after the selection matches a spooled file. The action performed depends on whether or not APU is able to complete the job successfully.
5. You can define up to 16 output actions. This allows you, for example, to use several different APU print definitions for the same spooled file.
6. One or more spooled files are placed into one or more output queues.

An Example of APU Monitor Processing

This section describes an example of how the concepts of the APU Monitor can be implemented in a customer environment.

A Customer Environment: Assume that a customer wants to set up the following environment:

- Three different output types are needed, with each going to a different output queue (OUTQs).
- Two printers are available, and the monitor is to be set up with the following requirements:
 - System output (QSYSPRT) must not use an APU print definition.
 - All jobs in OUTQ1 must be sent to PRT01
 - All jobs in OUTQ2 and OUTQ3 must be sent to PRT02
 - Application jobs APP01 and APP02 must be sent with a print definition **SAMPLE** applied
 - The application's original spooled files must be placed in the OUTQ called **SAVE**.
 - The original QSYSPRT spooled files must be deleted.

The Figure 113 diagrams these customer requirements. The numbers in the figure are used to identify the sequence of notes provided following this diagram.

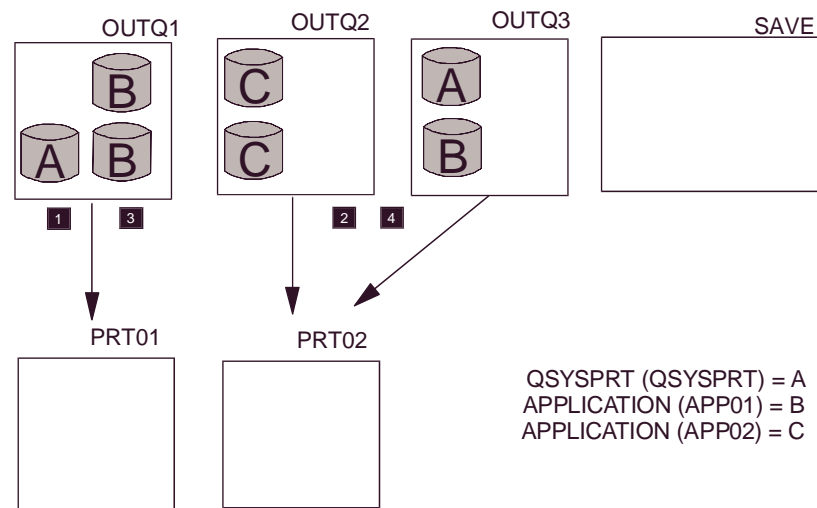


Figure 113. APU Monitor before Processing

Notes

1. All QSYSPRT spooled files from the OUTQ1 must be moved to OUTQ PRT01.
2. All QSYSPRT spooled files from all other OUTQs must be moved to OUTQ PRT02.
3. A print definition is to be applied to all application spooled files coming into OUTQ1. A new APU spooled file (the result of the APU processing) is to be placed in the output queue PRT01. The original SCS spooled file is moved into OUTQ SAVE.

4. A print definition is to be applied to all application spooled files coming into all other OUTQs. A new APU spooled file (the result of the APU processing) is to be placed in the output queue PRT02 for each original spooled file. The original SCS spooled file is to be moved into OUTQ SAVE.

Implementing the Customer Requirements on the APU Monitor: In the example, we can define two groups of spooled files: the application spooled files and the QSYSPRT spooled files. Only the application spooled files need an APU print definition. In this case, we want to define actions for the application spooled files first and then the action for the QSYSPRT spooled files. So we can say that all spooled files that are not eligible for APU are moved following the QSYSPRT spooled file actions.

Figure 114 shows which parameters must be defined for each action in the order of the action. The monitor takes the **Input selection** parameters of the first action to identify if the spool and selection match. If the input selection parameters do not match the spooled file, the monitor takes the next action. As soon as the input selection parameters match the spooled file, all action sequences such as **Input action** and **Output actions** proceed.

The numbers in the figure indicate the actions that correspond with Figure 114.

Action	Input selection	Input action	Output action
1. Action for spool 3	File = APP* OUTQ = Outq1	Success = *outq OUTQ = SAVE Failure = *hold	Prtdf = Sample OUTQ = PRT01
2. Action for spool 4	File = APP* OUTQ = *all	Success = *outq OUTQ = SAVE Failure = *hold	Prtdf = Sample OUTQ = PRT02
3. Action for spool 1	File = *all OUTQ = Outq1	Success = *outq OUTQ = PRT01 Failure = *hold	Prtdf = *none
4. Action for spool 2	File = *all OUTQ = *all	Success = *outq OUTQ = PRT02 Failure = *hold	Prtdf = *none

Figure 114. APU Monitor - Action Example

Notes

1. Action for the application spooled files in OUTQ1
2. Action for all other application spooled files in all monitored OUTQs
3. Action for all other spooled files in OUTQ1
4. Action for all other spooled files in all other OUTQs

Many other options are possible for each action. You can decide, for example, to delete the original spooled files after processing or hold the spooled files.

Condition of the Output Queue after Processing: In Figure 115 on page 192, you can see the two QSYSPRT spooled files (A), that all the original application spooled files are in output queue **SAVE**, and that the new AFPDS spooled files (outcome from APU processing) are placed in the output queues PRT01 and PRT02, depending on where the original was.

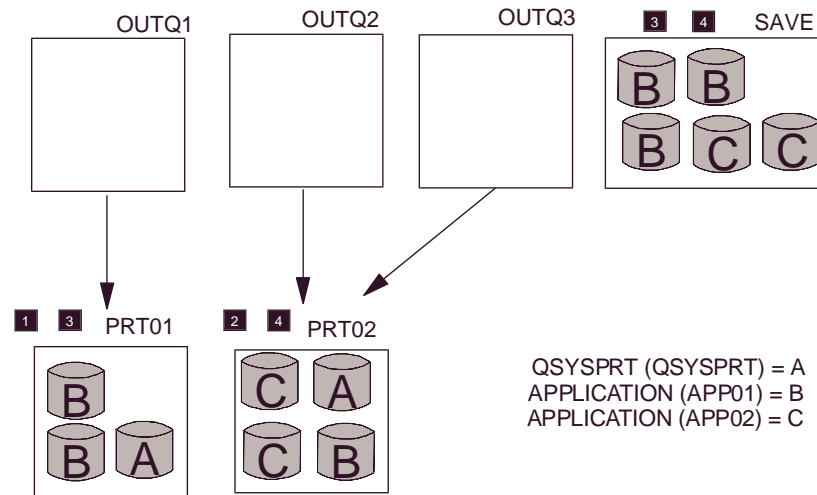


Figure 115. APU Monitor Example After Processing

Notes

1. The QSYSPRT spooled file from OUTQ1 is in the output queue PRT01.
2. All QSYSPRT spooled files from the other OUTQs are in the output queue PRT02.
3. The original application SCS spooled files from OUTQ1 are in the output queue SAVE. New AFPDS spooled files have been placed in the output queue PRT01. This new spooled file is the result from APU after applying the print definition.
4. All other original application SCS spooled files from all other OUTQs are placed in the output queue SAVE. New AFPDS spooled files have been placed in the output queue PRT02. These new spooled files result from APU after applying the print definition.

Note: If the processing for one spooled file fails, the original spooled file stays in the output queue in status *HOLD following the FAILURE parameter.

Chapter 13. Using Page Definitions and Form Definitions

When we look at DDS as an enabler for documents and reports, the integration of formatting with the application program was a significant advantage. It provides the application programmer with the capability to produce very customized output conditioned by the database and application data within the program.

However, there are environments where this tight integration is less desirable. It can make the task of coding application logic and output logic more complex because the logic is intertwined. Furthermore, the developer who works with the application programs may be different from the designer/developer that works with output formatting. There is a trade-off here: the customized output that DDS provides versus separation in the application development process.

New output formatting objects on the AS/400, page definitions and form definitions, provide a means to separate page formatting from the application program. These new objects, an industry standard in high-volume printing environments, were added to OS/400 with Version 3 Release 2 and Version 3 Release 7. The manner in which these formatting objects were implemented provides a dynamic method of transforming existing line-mode (SCS) print applications.

As illustrated in Figure 116 on page 194, an SCS print application sends lines of output to the output queue. With the simple reference of the page definition and form definition objects in the AS/400 printer file (and no changes to the application program), the output produced in the output queue is no longer SCS, but is AFP.

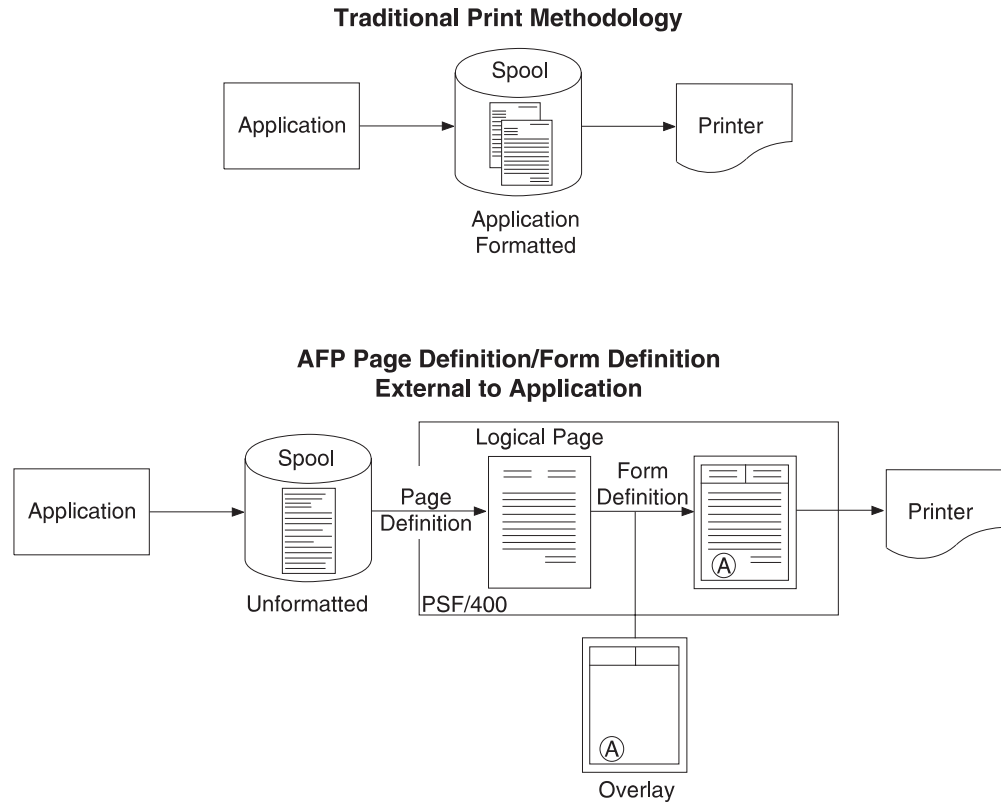


Figure 116. Traditional Printing Compared to Printing with Page Definitions and Form Definitions

Page definitions and form definitions look and act like page formatting programs. They are developed in a source language (which can be front-ended with several different graphical tools) that defines how information is to be placed on the page. Specifically, the page definition defines how data is placed on a logical page layout. Input print lines are read in, optionally parsed into individual fields, and place on the page. Similar in structure to DDS, the page definition language enables you to place print lines or print fields anywhere on the page while controlling font, orientation, and color characteristics. Data can also be printed in a selected bar code symbology. Figure 117 on page 195 shows a conceptual view of the function of the page definition.

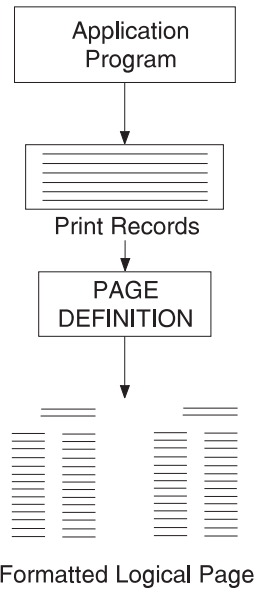


Figure 117. How a Page Definition is Used

Again like a program, page definitions can contain conditional logic. This means that the formatting rules can change based on the contents of an input field. A "trigger" field (for example, company number) may be used to select a whole series of formatting commands. The form definition is normally used in conjunction with the page definition (it can, however, be used by itself).

The form definition controls how the logical page (defined with the page definition) is placed on the physical medium - the sheet of paper. Source statements within the form definition specify what drawer paper is selected from, what overlay(s) is placed on top of the logical page layout, whether duplexing is used, whether multiple logical pages should be placed on a single physical page, what copies are to be automatically created, and what fields should be suppressed from which copy. Figure 118 on page 196 illustrates the form definition concept.

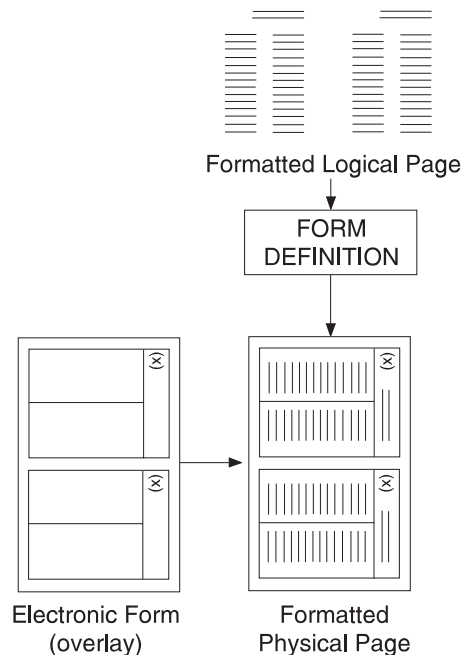


Figure 118. How a Form Definition is Used

An additional note should be made on the use of page and form definitions. In addition to specifying the form definition or page definition name in the printer file, the output file type must also be changed to *LINE. This indicates that the print lines will be passed to the page and form definition objects in a slightly different format than SCS. This format is called line data, and it adds blank lines (automatically) for vertical positioning and a couple of additional carriage control characters to each print record. Again, this is transparent to the application program. To the designer/developer of the page definition, however, they must be aware that space and skip to lines will be passed to the page definition as blank lines. They can either be printed as blank lines (to maintain vertical positioning) or thrown away, whichever is appropriate to a particular page layout.

How can you use Page Definitions and Form Definitions

1. Preparation stage
 - a. The application generates line data.
 - b. The person responsible for designing the output layout creates a page definition and form definition to format the line data into the desired form. This step may require a detailed knowledge of the application-generated line data.
2. Production stage
 - a. The application generates line data specifying the corresponding page definition and form definition resources through new parameters on the CRTPRTF and OVRPRTF commands.
 - b. The line data is sent to an AFP(*YES) defined printer where PSF/400 uses the page definition and form definition specifications to create a formatted data stream which is sent to the printer.

Note: page definitions and form definitions can either be created directly by the customer using Page Printer Formatting Aid (PPFA) or obtained

through Business Partner products and services. Examples in this chapter show how to program with PPFA.

Specifying the Logical Page with Page Definitions

Page definitions control the following functions:

- Dimensions of the logical page
- Print direction of the logical page (landscape or portrait)
- Print direction of lines and fields relative to the logical page
- Conditional processing (enabling the content of the print data to control the layout and media handling of the print job)
- Line spacing (number of lines per inch)
- Location of individual lines and fields
- Number of lines per page
- Page segments for inclusion in printed output
- Overlays for inclusion in printed output (position anywhere on the page)
- Page-ejection points
- Fonts and font rotation used on a page
- Multiple-up printing (placing more than one logical page on one side of a single sheet)
- Colors to be used (on printers that support this function, or for viewing)

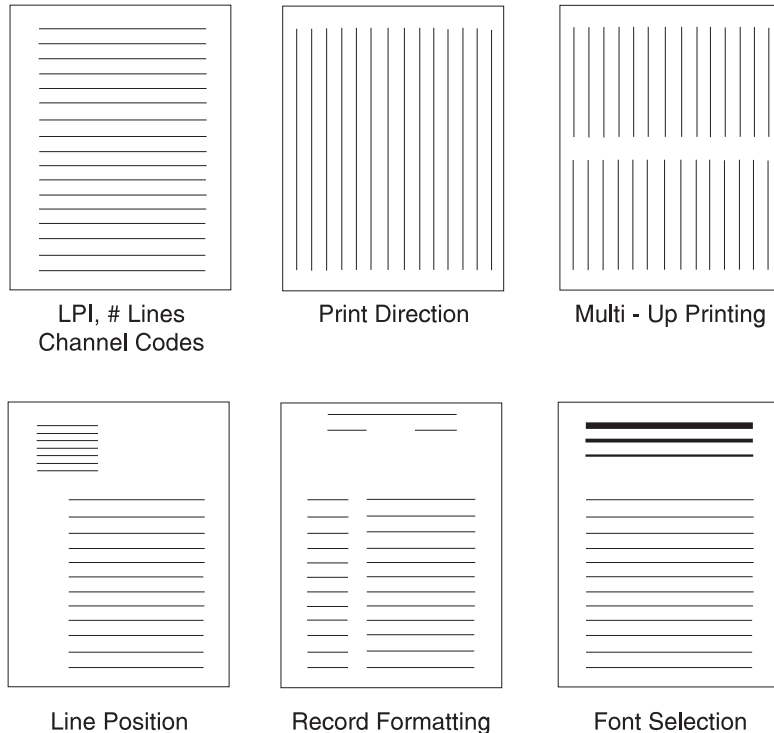


Figure 119. Page Definition Functions

PPFA Sample Page Definition Source and Output

Before you create a page definition, you should examine the application-generated line data. In the following example, a sample invoice application generates these records:

1John Smith
690 Bean Hill Road
Louisville, KY 50301

193-45-8901

Don't forget to take advantage of an abundance of online material on our new World Wide Web homepage at <http://www.stocks-r-us.com>.

General Parts Inc.	(GPIX)	67.00	68.25	67.75
Rasterpunkt Inc.	(RPGMBH)	14.00	15.00	15.00
Ecocycle Inc.	(ECO)	5.25	5.50	5.25

1Linda Noll
14 Hillcrest Drive
Houston, TX 60443

677-12-7468

Don't forget we offer a preapproved Check payment plan. Call our toll-free number 1-800-STOCKSR to join.

The Page Printer Formatting Aid source code needed to generate the page definition for the previous example is as follows:

```
5763PW1 V3R2M0 960917          SEU SOURCE LISTING
SOURCE FILE . . . . . AFPLIB/PAGEDEFSRC
MEMBER . . . . . STOCKQ
SEQNBR*...+... 1 ...+... 2 ...+... 3 ...+... 4 ...+... 5 ...+... 6 ...+... 7 ..
100  PAGEDEF STOCKQ          /* CVTPPFASRC will create P1STOCKQ */
200  REPLACE YES             /* PPFA should replace existing copy */
300  LINEONE 0.5 IN 1.0 IN;  /* Position of topmost line */
400  FONT BIG PR10;          /* Prestige Roman 10 Char/Inch */
500  FONT NORM PR12;         /* Prestige Roman Normal 12 Char/Inch */
600  FONT ITAL PI12;         /* Prestige Italic Normal 12 Char/Inch */
700  SETUNITS LINESP 6 LPI;  /* 6 lines per inch */
800
900  /* Customer Address Block - 4 input lines */
1000 PRINTLINE
1100  CHANNEL 1              /* When an input line has a first col. */
1200                          /* (CC) '1' value, this PRINTLINE gets */
1300                          /* control - meaning: top of a new page */
1400  POSITION 2 IN 1 IN      /* position across 2 inches down 1 inch */
1500  FONT BIG              /* Use the font nicknamed BIG */
1600  REPEAT 4;              /* Do this for 4 lines - subsequent */
1700                          /* lines are positioned down the page */
1800                          /* at 6 lines/inch (see SETUNITS above).*/
1900
2000 /* Soc. Sec. Number - 1 input line rotated/placed in upper right */
2100 PRINTLINE
2200  POSITION 7.8 IN 0.8 IN /* position across 7.75 in down 0.75 in */
2300  FONT NORM             /* Use the font nicknamed NORM */
2400  DIRECTION DOWN;       /* Print down the page (rotated 90 dgs) */
2500
2600 /* Customer-specific text - 2 input lines */
2700 PRINTLINE
2800  POSITION 1.25 IN 3.0 IN /* position across 1.25 in down 3 in */
2900  FONT ITAL             /* use the font nicknamed ITAL */
3000  REPEAT 2;             /* Do this for two input lines */
3100
3200 /* Sales Quote - up to 30 lines of text */
3300 PRINTLINE
3400  POSITION 2.5 IN 4.25 IN /* position across 2.5 in down 4.25 in */

```



```

3500      FONT NORM          /* Use the font nicknamed NORM      */
3600      REPEAT 30;        /* Do this for up to 30 input lines */
                        * * * * E N D   O F   S O U R C E   * * * *

```

The results of this page definition when used with a form definition are shown in Figure 125 on page 204 and Figure 126 on page 205.

For more information on PPFA page definition commands, refer to the *IBM Page Printer Formatting Aid: User's Guide*.

How to Create a Page Definition Using the PPFA Compiler

The following example shows how to create a page definition on the AS/400 using the PPFA compiler and the PPFA page definition source code shown in the previous section. The source code for the page definition is assumed to exist in the AFPLIB/page definition SRC (STOCKQ) member.

You can create a page definition using the PPFA compiler in either of two ways:

- Using the command line interface
- Using the Convert PPFA Source (CVTPPFASRC) display

Creating a Page Definition with PPFA

Creating a page definition with PPFA is a two-step process:

1. Convert the PPFA source code to a page definition output data base file member. You can do this in either of two ways:

- a. Type the command:

```
cvtppfasrc file(afplib/pagdefsrc) mbr(stockq) pagdfnfile(afplib/ppfaout)
```

and press Enter

- b. Type the command: `cvtppfasrc` and press F4. The following display appears:

Convert PPFA Source (CVTPPFASRC)

Type choices, press Enter.

File	PAGEDEFSRC	Name
Library	AFPLIB	Name, *LIBL, *CURLIB
Member	STOCKQ	Name
Form definition file	*NONE	Name, *NONE
Library		Name, *LIBL, *CURLIB
Page definition file	PPFAOUT	Name, *NONE
Library	AFPLIB	Name, *LIBL, *CURLIB
Listing output	*PRINT	*PRINT, *NONE
Source listing options		*SRC, *NOSRC, *SECLVL...

F3=Exit F4=Prompt F5=Refresh F12=Cancel F13=How to use this display

F24=More keys

Type the values you want on the display and press Enter.

Notes:

- a. Make sure that the qppfa library is in your library list (you can do this with the `addlib qppfa` command).
 - b. In creating the output member in the previous step, the PPFA compiler, which is invoked by issuing the `CVTPPFASRC` command, adds two characters ("P1" for page definitions and "F1" for form definitions) to the front of the name you specify on the page definition and form definition statements in the PPFA source code. Adding these two characters enables you to put a page definition and a form definition in the same AS/400 file under different member names.
2. Create the AS/400 page definition object, which has a type of *PAGDFN. You can do this in either of two ways:
- a. Type the command:
`crtpagdfn pagdfn(afplib/stockq) file(afplib/ppfaout) mbr(p1stockq)`

and press Enter
 - b. Type the command: `crtpagdfn` and press F4. The following display appears: Type the values you want on the display and press Enter.

Create Page Definition (CRTPAGDFN)

Type choices, press Enter.

Page definition	> STOCKQ	Name
Library	> AFPLIB	Name, *CURLIB
File	PPFAOUT	Name
Library	AFPLIB	Name, *LIBL, *CURLIB
Member	P1STOCKQ	Name, *PAGDFN
Text 'description'	*MBRTXT	

Bottom

F3=ExitF4=PromptF5=RefreshF10=Additional parametersF12=Cancel

F13=How to use this displayF24=More keys

Figure 120. Create Page Definition (CRTPAGDFN) Display

Specifying the Physical Media with Form Definitions

Form definitions specify the following functions:

- Position of a logical page on a physical page
- Duplex printing
- Inclusion of overlays, which substitute for preprinted forms
- Selection of the number of copies for any page of data
- Suppression (the exclusion of selected fields of data in one print)
- Jog (the offset stacking of cut-sheet output or copy marking on continuous-forms output)
- Selection among paper sources in a cut-sheet printer
- Quality (selection among print quality levels)
- Constant back (enables printing of a page without variable data)

- Printing up to 8 logical pages of any size in any position on either side of a sheet (for example, you could have 2 logical pages on one side of a sheet and 6 logical pages on the other side of the same sheet)
- Postprocessing controls, such as:
 - selecting functions
 - perforating
 - cutting
 - stapling
 - folding

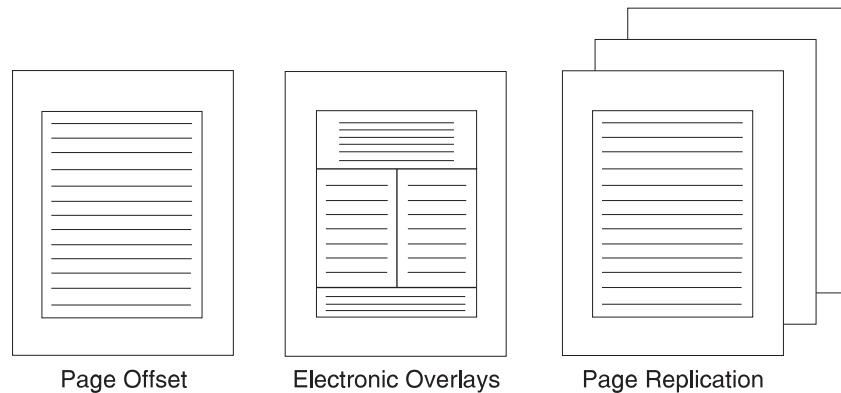


Figure 121. Form Definition Functions

PPFA Sample Form Definition Source and Output

The following is an example of form definition source and output.

```

5763PW1 V3R2M0 960917                      SEU SOURCE LISTING
SOURCE FILE . . . . . AFPLIB/FORMDEFSRC
MEMBER . . . . . STOCKQ
SEQNBR*...+... 1 ...+... 2 ...+... 3 ...+... 4 ...+... 5 ...+... 6 ...+... 7 ..
100  FORMDEF STOCKQ                          /* CVTPPFASRC will create F1STOCKQ */
200  REPLACE YES;                            /* PPFA should replace existing copy */
300
400  OVERLAY QSHEET;                          /* 01QSHEET to be used - Quote Sheet */
500  OVERLAY ARCHIV;                         /* 01ARCHIV to be used - "Archive" lbl */
600  OVERLAY CUSTMR;                         /* 01CUSTMR to be used - "Customer" lbl */
700
800  /* For each page of application data, two pages will be printed: */
900  /* one labelled "Archive Copy" for archival and the other labelled*/
1000 /* "Customer Copy" to be mailed to the customer. */
1100 SUBGROUP COPIES 1 OVERLAY QSHEET ARCHIV; /* Archive Copy */
1200 SUBGROUP COPIES 1 OVERLAY QSHEET CUSTMR; /* Customer Copy */
                                     * * * * E N D   O F   S O U R C E * * * *

```

The results of this form definition when used with a page definition are shown in Figure 125 on page 204 and Figure 126 on page 205.

For more information on PPFA form definition commands, refer to the *IBM Page Printer Formatting Aid: User's Guide*.

How to Create a Form Definition Using the PPFA Compiler

The following example shows how to create a form definition on the AS/400 using PPFA and the PPFA form definition source code shown in the previous section. The source code for the form definition is assumed to exist in member STOCKQ in the AFPLIB/form definition SRC source file.

You can create a form definition with PPFA in either of two ways:

- Using the command line interface
- Using the Convert PPFA Source (CVTPPFASRC) display

Creating a Form Definition with PPFA

Creating a form definition with PPFA is a two step process:

1. Convert the PPFA source code to a form definition output data base file member. You can do this in either of two ways:

- a. Type the command:

```
cvtppfasrc file(afplib/formdefsrc) mbr(stockq) formdffile(afplib/ppfaout)
```

and press Enter.

- b. Type the command: cvtppfasrc and press F4. The following display appears:

Type the values you want on the display and press Enter.

Convert PPFA Source (CVTPPFASRC)

Type choices, press Enter.

File	FORMDEFSRC	Name
Library	AFPLIB	Name, *LIBL, *CURLIB
Member	STOCKQ	Name
Form definition file	PPFAOUT	Name, *NONE
Library	AFPLIB	Name, *LIBL, *CURLIB
Page definition file	*NONE	Name, *NONE
Library		Name, *LIBL, *CURLIB
Listing output	*PRINT	*PRINT, *NONE
Source listing options		*SRC, *NOSRC, *SECLVL...

F3=Exit F4=Prompt F5=Refresh F12=Cancel F13=How to use this display
F24=More keys

Figure 122. Convert PPFA Source (CVTPPFASRC) Display

Note: In creating the output member in the previous step, the PPFA compiler, which is invoked by issuing the *CVTPPFASRC* command, adds two characters ("P1" for page definitions and "F1" for form definitions) to the front of the name you specify on the page definition and form definition statements in the PPFA source code. Adding these two characters enables you to put a page definition and a form definition in the same AS/400 file under different names.

2. Create the AS/400 form definition object, which has a type of *FORMDF. You can do this in either of two ways:

- a. Type the command:

```
crtformdf formdf(afplib/stockq) file(afplib/ppfaout) mbr(f1stockq)
```

and press Enter.

- b. Type the command: crtformdf and press F4. The following display appears:

Create Form Definition (CRTFORMDF)

Type choices, press Enter.

Form definition	> STOCKQ	Name
Library	> AFPLIB	Name, *CURLIB
File	PPFAOUT	Name
Library	AFPLIB	Name, *LIBL, *CURLIB
Member	F1STOCKQ	Name, *FORMDF
Text 'description'	*MBRTXT	

Bottom

F3=Exit
F4=Prompt
F5=Refresh
F10=Additional parameters
F12=Cancel

F13=How to use this display
F24=More keys

Figure 123. Create Form Definition (CRTFORMDF) Display

Type the values you want on the display and press Enter.

Figure 124 visually illustrates the process of creating page definitions and form definitions using PPFA as shown in the previous examples.

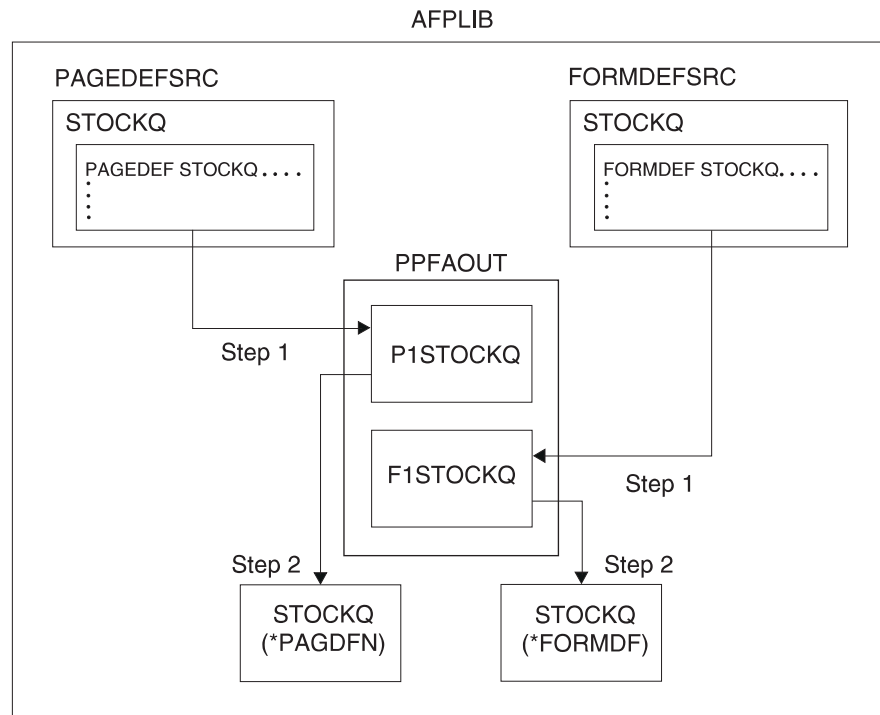


Figure 124. Creating Page Definitions and Form Definitions Using PPFA

Form Definition Example Output

When PSF/400 processes the line data described above with the sample page definition and form definition, it produces output as shown in Figure 125 and Figure 126 on page 205.

John Smith 690 Bean Hill Road Louisville, KY 50301	193-45-8901	Archive Copy	Customer Copy																				
Don't forget to take advantage of an abundance of online material on our new World Wide Web homepage at http://www.stocks-r-us.com .			lence of online material on our / www.stocks-r-us.com .																				
<p>Your personalized stock quote:</p> <table border="0"> <tr> <td>General Parts Inc. (GPIX)</td> <td>67.00</td> <td>68.25</td> <td>67.75</td> </tr> <tr> <td>Rasterpunkt Inc. (RPGMBH)</td> <td>14.00</td> <td>15.00</td> <td>15.00</td> </tr> <tr> <td>Ecocycle Inc. (ECO)</td> <td>5.25</td> <td>5.50</td> <td>5.25</td> </tr> </table> <p>STOCKS-R-US is the leader in convenient stock purchasing</p>	General Parts Inc. (GPIX)	67.00		68.25	67.75	Rasterpunkt Inc. (RPGMBH)	14.00	15.00	15.00	Ecocycle Inc. (ECO)	5.25	5.50	5.25		<p>stock quote:</p> <table border="0"> <tr> <td>67.00</td> <td>68.25</td> <td>67.75</td> </tr> <tr> <td>14.00</td> <td>15.00</td> <td>15.00</td> </tr> <tr> <td>5.25</td> <td>5.50</td> <td>5.25</td> </tr> </table>	67.00	68.25	67.75	14.00	15.00	15.00	5.25	5.50
General Parts Inc. (GPIX)	67.00	68.25	67.75																				
Rasterpunkt Inc. (RPGMBH)	14.00	15.00	15.00																				
Ecocycle Inc. (ECO)	5.25	5.50	5.25																				
67.00	68.25	67.75																					
14.00	15.00	15.00																					
5.25	5.50	5.25																					
STOCKS-R-US is the leader in convenient stock purchasing																							

Figure 125. Form Definition Example - Customer 1

Linda Noll 14 Hillcrest Drive Huston, TX 60443	677-12-7468	Customer Copy
Don't forget we offer a pre-approved Check payment plan. Call our toll-free number 1-800-STOCKSR to join.		
<p>Your personalized stock quote:</p> <p>Management Plus Co.(MGTPLS) 25.50 28.75 26.25</p> <p>STOCKS-R-US is the leader in convenient stock purchasing</p>		<p>Check payment plan. Call our</p> <p>stock quote:</p> <p>25.50 28.75 26.25</p>
		<p>STOCKS-R-US is the leader in convenient stock purchasing</p>

Figure 126. Form Definition Example - Customer 2


Super Sun Seeds Invoice Case Study

In this section, we repeat the Super Sun Seeds Invoice case study and show the source input data used to create it. The sample invoice illustrates the following advanced capabilities:

- Dynamic page format switching based on application data content
- Constant Terms and Conditions overlay on the back sides of specified pages, without requiring the application to generate a page eject
- Producing multiple copies of specified pages with different purposes (for example, a packing slip, customer copy, and file copy) without requiring the application to generate each variation
- Suppressing price data from the packing slip copy

The PPFA source code needed to generate the page definition and form definition for the line data shown in the following examples is in “Appendix L. Page Definition and Form Definition Source Code for Super Sun Seeds” on page 367.


Examples of Formatted Printout

 Super Sun Seeds A Growth Company		400 CPU Parkway Vegetaria, NJ 08590 Office: 555-499-2367 Fax: 555-415-9794	
TEST COMPANY TEST STREET TEST CITY TS 12345-6789		SAME -- Sold To -- -- Ship To --	
Customer Number: 100	Invoice Number: 31300	Invoice Date: 11/06/95	Payment Date: 12/06/95
Ship Via: BEST WAY Ship Date: 11/06/95 Terms: NET 30 Salesman: TESTSALES			
Qty	UOM	Item #	Item Description
1	CT	00000300	HIGH ALTITUDE WATERMELON
1	PK	01100517	SPARTAN SEEDS
9	PK	04569870	NORTHERN LIGHT BLUE SPRUCE
12	BX	11005004	BUSH GREEN SEEDS
12	CT	11005011	LASSO RED SEEDS
26	PK	11005018	EARLY BANTAM SEEDS
5	BX	11057893	AFRICAN DAISY, SEEDS
1	PK	15975365	HEAVY OAK
33	BX	32746510	HOPS BREWING LIGHT
33	BX	32746510	HOPS BREWING LIGHT
6	EA	46578913	SEED SURVEYING SITE
2	BX	56413213	POT POT
80	PK	65412384	SEED SCRUBBER
1	PK	84512023	OREGON SPRING TOMATO SEED
2	DZ	96325874	PINEAPPLE-ORANGE SEEDS
11	BX	98412006	BLACK BEAUTY ZUCCHINI
5	EA	98546320	FROZEN JUICE PROCESSOR
Thank You ... Because you have ordered over \$500 of seeds this year, on your next seed order, you will receive a 10% discount.			
Total Due			
Return this tear-off strip with your payment.			
Payment is due by: 12/06/95		Make Checks Payable to: Super Sun Seeds	
TEST COMPANY TEST STREET TEST CITY TS 123456789		Amount Due is:	
Packing List			
TEST CITY TS 123456789		Page 1	

per n eds Growth Company Office: 555-499-2367 Fax: 555-415-9794		SAME -- Ship To --	
Invoice Date: 11/06/95	Payment Date: 12/06/95	Terms: NET 30 Salesman: TESTSALES	
Item	Price	Extension	
ATERMELON	1.01	1.01	
LUE SPRUCE	858.32	7,724.88	
S	2.50	30.00	
EDS	892.23	10,706.76	
SEEDS	.38	9.88	
GHT	1.20	39.60	
SITE	50.00	300.00	
CESSOR	7.65	15.30	
OMATO SEED	888.79	71,103.20	
E SEEDS	.97	2.58	
CHINI	2.30	25.30	
CESSOR	109.90	549.50	
Total Due			\$90,691.81
Make Checks Payable to: Super Sun Seeds			Amount Due is:
TEST CITY TS 123456789			Page 1



per n eds Growth Company Office: 555-499-2367 Fax: 555-415-9794		SAME -- Ship To --	
Invoice Date: 11/06/95	Payment Date: 12/06/95	Terms: NET 30 Salesman: TESTSALES	
Item	Price	Extension	
ATERMELON	1.01	1.01	
LUE SPRUCE	858.32	7,724.88	
S	2.50	30.00	
EDS	892.23	10,706.76	
SEEDS	.38	9.88	
GHT	1.20	39.60	
SITE	50.00	300.00	
CESSOR	7.65	15.30	
OMATO SEED	888.79	71,103.20	
E SEEDS	.97	2.58	
CHINI	2.30	25.30	
CESSOR	109.90	549.50	
Total Due			\$90,691.81
Make Checks Payable to: Super Sun Seeds			Amount Due is:
TEST CITY TS 123456789			Page 1

Figure 127. Three Copies of a Single-Page Customer Invoice

 Super Sun Seeds A Growth Company		400 CPU Parkway Vegetation, NJ 55090 Office: 555-499-2367 Fax: 555-415-9794			
THE LAST LEAF 340 DESPERADO COURT LONGVIEW CA 12345-6789 -- Sold To --		CAMBIA LAYER LIMITED 2222 SAPLING CIRCLE BAKERSVILLE BC 47365-7290 -- Ship To --			
Customer Number: 154	Invoice Number: 31354	Invoice Date: 11/06/95	Payment Date: 12/06/95		
Ship Via: TREE TRUCK Ship Date: 11/06/95 Terms: NET 15 Salesman: MARY PINETREER					
Qty	UOM	Item #	Item Description	Price	Extension
9	EA	00231300	SEED ROASTER OVEN SET		
9	EA	00231300	SEED ROASTER OVEN SET		
4	PK	03698741	STRING GRAPEFRUIT		
4	PK	03698741	STRING GRAPEFRUIT		
300	EA	11000146	AZALEA, GIANT ROSE SEEDS		
300	EA	11000146	AZALEA, GIANT ROSE SEEDS		
6	CT	11005010	EARLY DWARF DANISH SEEDS		
24	DZ	11005013	MINOR NANTES CARROT SEED		
6	DZ	11005013	MINOR NANTES CARROT SEED		
24	PK	11005020	FRENCH PICKLING SEEDS		
12	CT	12382910	SUCCOTASH SEEDS		
12	CT	12382910	SUCCOTASH SEEDS		
55	CT	13145340	SOUR GRAPE SEED		
55	CT	13145340	SOUR GRAPE SEED		
14	BZ	32165478	BLACK EYED BANANA		
14	BZ	32165478	BLACK EYED BANANA		
600	DZ	44646510	PLUMP RED PLUMS		
600	DZ	44646510	PLUMP RED PLUMS		
40	DZ	45613712	CRANAPPLE BERRY SEEDS		
40	DZ	45613712	CRANAPPLE BERRY SEEDS		
4	PK	65412384	SEED SCRUBBER		
4	PK	65412384	SEED SCRUBBER		
1	PK	65412384	SEED SCRUBBER		
1	PK	65412384	SEED SCRUBBER		
12	DZ	84512130	SUB-ARCTIC TOMATO SEEDS		
12	DZ	84512130	SUB-ARCTIC TOMATO SEEDS		
Packing List				CONTINUED	Page 1

Customer Copy		CONTINUED	Page 1
----------------------	--	-----------	--------

File Copy		CONTINUED	Page 1
------------------	--	-----------	--------

 Super Sun Seeds A Growth Company		400 CPU Parkway Vegetation, NJ 55090 Office: 555-499-2367 Fax: 555-415-9794			
THE LAST LEAF 340 DESPERADO COURT LONGVIEW CA 12345-6789 -- Sold To --		CAMBIA LAYER LIMITED 2222 SAPLING CIRCLE BAKERSVILLE BC 47365-7290 -- Ship To --			
Customer Number: 154	Invoice Number: 31354	Invoice Date: 11/06/95	Payment Date: 12/06/95		
Ship Via: TREE TRUCK Ship Date: 11/06/95 Terms: NET 15 Salesman: MARY PINETREER					
Qty	UOM	Item #	Item Description	Price	Extension
951	PK	11005018	EARLY BANTAM SEEDS		
46	PK	11005018	EARLY BANTAM SEEDS		
45	PK	11005018	EARLY BANTAM SEEDS		
4	BK	11057893	AFRICAN DAISY, SEEDS		
4	BK	11057893	AFRICAN DAISY, SEEDS		
100	EA	31321655	SEMILLAS DEL SUS SOMBREROS		
100	EA	31321655	SEMILLAS DEL SUS SOMBREROS		
1000	BK	56413213	POT POT		
 Thank You Because you have ordered over \$500 of seeds this year, on your next seed order, you will receive a 10% discount.					
Total Due					
Return this tear-off strip with your payment.				Make Checks Payable to: Super Sun Seeds	
Payment is due by: 12/06/95				Amount Due is:	
Packing List 340 DESPERADO COURT LONGVIEW CA 123456789				Page 2	

Customer Copy		Page 2
----------------------	--	--------

File Copy		Page 2
------------------	--	--------

Figure 128. Three Copies of a Two-Page Customer Invoice. Each page of the example invoice uses a different format.

View of Application-Generated Line Data

The following is an example of line data produced by an application program.

1	TEST COMPANY	SAME		
	TEST STREET			
	TEST CITY			
	TS 12345-6789			
	100	31300	11/06/95	12/06/95
	BEST WAY	11/06/95	NET 30	TESTSALES
1 CT	00000300	HIGH ALTITUDE WATERMELON	1.01	1.01
1 PK	01100517	SPARTAN SEEDS	2.39	2.39
9 PK	04569870	NORTHERN LITE BLUE SPRUCE	858.32	7,724.88
12 BX	11005004	BUSH GREEN SEEDS	2.50	30.00
12 CT	11005011	LASSO RED SEEDS	892.23	10,706.76
26 PK	11005018	EARLY BANTAM SEEDS	.38	9.88
5 BX	11057893	AFRICAN DAISY, SEEDS	2.35	11.75
1 PK	15975365	HEAVY OAK	129.09	129.09
33 BX	32746510	HOPS BREWING LIGHT	1.20	39.60
33 BX	32746510	HOPS BREWING LIGHT	1.20	39.60
6 EA	46578913	SEED SURVEYING SITE	50.00	300.00
2 BX	56413213	POT POT	7.65	15.30
80 PK	65412384	SEED SCRUBBER	888.79	71,103.20
1 PK	84512023	OREGON SPRING TOMATO SEED	.97	.97
2 DZ	96325874	PINEAPPLE-ORANGE SEEDS	1.29	2.58
11 BX	98412006	BLACK BEAUTY ZUCCHINI	2.30	25.30
5 EA	98546320	FROZEN JUICE PROCESSOR	109.90	549.50

Thank You
 Because you have ordered
 over \$500 of seeds this
 year, on your next seed
 order you will receive
 a 10% discount.

\$90,691.81
 \$90,691.81

12/06/95

TEST COMPANY
 TEST STREET
 TEST CITY
 TS 123456789

Page 1

1	ORGANIC GARDEN SUPPLIES	ORGANICS-ON-THE-MOVE		
	546 PRODUCE WAY	3872 NATURE'S WAY		
	GOLDENOATS	NOCHEMS		
	CO 94523-4852	AK 49972-5341		
	136	31336	11/06/95	12/06/95
	CLEAN TRK	11/06/95	NET 30	CHRIS SEEDER
90 CT	00000300	HIGH ALTITUDE WATERMELON	1.01	90.90
550 CT	00000300	HIGH ALTITUDE WATERMELON	1.01	555.50
100 EA	00001200	ARBOLES DEL SUR	45.00	4,500.00
25 EA	00231300	SEED ROASTER OVEN SET	199.99	4,999.75
5 EA	00231300	SEED ROASTER OVEN SET	199.99	999.95
150 PK	04569870	NORTHERN LITE BLUE SPRUCE	858.32	28,748.00
2 BX	11005000	FAVA SEEDS	3.90	7.80
2 BX	11005001	PURPLE TEEPEE SEEDS	4.44	8.88
52 BX	11005002	BUSH WAX SEEDS	2.00	104.00
52 BX	11005003	KINGHORN WAX SEEDS	2.13	110.76
8 BX	11005004	BUSH GREEN SEEDS	2.50	20.00
8 BX	11005005	BLUE LAKE GREEN SEEDS	4.00	32.00
2 BX	11005006	KINGHORN WAX SEEDS	3.00	6.00
2 CT	11005007	VENTURE GREEN SEEDS	1.50	3.00
100 CT	11005008	NORTHEASTERN POLE SEEDS	1.29	129.00
100 CT	11005009	KENTUCKY BLUE SEEDS	2.10	210.00
58 CT	11005010	EARLY DWARF DANISH SEEDS	3.01	174.58
58 CT	11005011	LASSO RED SEEDS	892.23	51,749.34

84	EA	11005012	BLUE MAX SAVOY BEANS	1.23	103.32
84	DZ	11005013	MINCOR NANTES CARROT SEED	.87	73.08
10	DZ	11005014	SCARLET NANTES SEEDS	5.90	59.00
5	DZ	11005014	SCARLET NANTES SEEDS	5.90	29.50
10	BZ	11005015	CHANTENAY SEEDS	2.19	21.90
63	BZ	11005016	TOUCHON SEEDS	2.83	178.29
65	BZ	11005016	TOUCHON SEEDS	2.83	183.95
63	BZ	11005016	TOUCHON SEEDS	2.83	178.29

CONTINUED

Page 1

1	ORGANIC GARDEN SUPPLIES	ORGANICS-ON-THE-MOVE			
	546 PRODUCE WAY	3872 NATURE'S WAY			
	GOLDENOATS	NOCHEMS			
	CO 94523-4852	AK 49972-5341			
	136	31336			
	CLEAN TRK	11/06/95			
		NET 30			
		12/06/95			
		CHRIS SEEDER			
2	PK	11005018	EARLY BANTAM SEEDS	.38	.76
2	PK	11005019	NORTHERN PICKLING SEEDS	.39	.78
90	PK	11005020	FRENCH PICKLING SEEDS	2.39	215.10
100	BX	11057893	AFRICAN DAISY, SEEDS	2.35	235.00
25	CT	12382910	SUCCATASH SEEDS	.38	9.50
45	CT	13145340	SOUR GRAPE SEEDS	.15	6.75
10	PT	15789342	BLUE BELLES, BRIGHT BLUE	18.57	185.70
50	PK	15975365	HEAVY OAK	129.09	6,454.50
25	EA	31321654	BELLSTAR SEEDS	7.88	197.00
2	EA	31321654	BELLSTAR SEEDS	7.88	15.76
25	DZ	32154657	PETERSBURG PALM TREE	34.90	872.50
6	BZ	32165478	BLACK EYED BANANA	3.01	18.06
45	BX	32746510	HOPS BREWING LIGHT	1.20	54.00
10	CT	35456031	SUNNY SUNFLOWER SEEDS	1.23	12.30
50	EA	35715924	SEED SIFTER SET	2,900.00	45,000.00
18	EA	40113254	FRESH FRUIT CANNED CANNER	22.97	413.46
6	BX	56413213	POT POT	7.65	45.90
1000	PK	64132029	PITLESS PEACH SEEDS	.97	970.00
500	EA	90978412	TREE TRIMMER TUBING	.20	100.00
6	CT	94875081	EARLIROUGE TOMATO SEEDS	.49	2.94
45	BX	98412006	BLACK BEAUTY ZUCCHINI	2.30	103.50
5	EA	98546320	FROZEN JUICE PROCESSOR	109.90	549.50

CONTINUED

Page 2

1	ORGANIC GARDEN SUPPLIES	ORGANICS-ON-THE-MOVE
	546 PRODUCE WAY	3872 NATURE'S WAY
	GOLDENOATS	NOCHEMS
	CO 94523-4852	AK 49972-5341
	136	31336
	CLEAN TRK	11/06/95
		NET 30
		12/06/95
		CHRIS SEEDER

Thank You
 Because you have ordered
 over \$500 of fruit this
 year, on your next fruit
 order you will receive
 a 10% discount.

\$148,739.80
 \$148,739.80

12/06/95
 ORGANIC GARDEN SUPPLIES
 546 PRODUCE WAY
 GOLDENOATS
 CO 945234852

Page 3

1 LOS ARBOLES DEL MUNDO
 32483 ARBOL LANE
 MESA VERDE
 IL 54078-9390

SAME

	141	31341	11/06/95	12/06/95
		11/06/95	N10	MICHELE GOODACRE
900 EA	00001200	ARBOLES DEL SUR	45.00	40,500.00
900 EA	00001200	ARBOLES DEL SUR	45.00	40,500.00
6 EA	00001200	ARBOLES DEL SUR	45.00	270.00
6 EA	00001200	ARBOLES DEL SUR	45.00	270.00
951 CT	11005011	LASO RED SEEDS	892.23	48,510.73
46 DZ	11005014	SCARLET NANTES SEEDS	5.90	271.40
45 BZ	11005015	CHANTENAY SEEDS	2.19	98.55
951 PK	11005018	EARLY BANTAM SEEDS	.38	361.38
46 PK	11005018	EARLY BANTAM SEEDS	.38	17.48
45 PK	11005018	EARLY BANTAM SEEDS	.38	17.10
4 BX	11057893	AFRICAN DAISY, SEEDS	2.35	9.40
4 BX	11057893	AFRICAN DAISY, SEEDS	2.35	9.40
100 EA	31321655	SEMILLAS DEL SUS SOMBEROS	24.95	2,495.00
100 EA	31321655	SEMILLAS DEL SUS SOMBEROS	24.95	2,495.00
1000 BX	56413213	POT POT	7.65	7,650.00
1000 BX	56413213	POT POT	7.65	7,650.00
98 PK	84512023	OREGON SPRING TOMATO SEED	.97	95.06
98 PK	84512023	OREGON SPRING TOMATO SEED	.97	95.06

Thank You
 Because you have ordered
 over \$500 of trees this
 year, on your next tree
 order you will receive
 a 10% discount.

\$151,315.56
 \$151,315.56

12/06/95
 LOS ARBOLES DEL MUNDO
 32483 ARBOL LANE
 MESA VERDE
 IL 540789390

Page 1

1 THE LAST LEAF
 340 DESPERADO COURT
 LONGVIEW
 CA 12345-6789

CAMBIUM LAYER LIMITED
 2222 SAPLING CIRCLE
 BARKERSVILLE
 BC 47365-7290

	154	31354	11/06/95	12/06/95
	TREE TRUCK	11/06/95	NET 15	MARY PINETREE
9 EA	00231300	SEED ROASTER OVEN SET	199.99	1,799.91
9 EA	00231300	SEED ROASTER OVEN SET	199.99	1,799.91
4 PK	03698741	STRING GRAPEFRUIT	2.01	8.04
4 PK	03698741	STRING GRAPEFRUIT	2.01	8.04
300 EA	11000146	AZALIA, GIANT ROSE SEEDS	.55	165.00
300 EA	11000146	AZALIA, GIANT ROSE SEEDS	.55	165.00

6 CT	11005010	EARLY DWARF DANISH SEEDS	3.01	18.06
24 DZ	11005013	MINCOR NANTES CARROT SEED	.87	20.88
6 DZ	11005013	MINCOR NANTES CARROT SEED	.87	5.22
24 PK	11005020	FRENCH PICKLING SEEDS	2.39	57.36
12 CT	12382910	SUCCATASH SEEDS	.38	4.56
12 CT	12382910	SUCCATASH SEEDS	.38	4.56
55 CT	13145340	SOUR GRAPE SEEDS	.15	8.25
55 CT	13145340	SOUR GRAPE SEEDS	.15	8.25
14 BZ	32165478	BLACK EYED BANANA	3.01	42.14
14 BZ	32165478	BLACK EYED BANANA	3.01	42.14
600 DZ	44646510	PLUMP RED PLUMS	.49	294.00
600 DZ	44646510	PLUMP RED PLUMS	.49	294.00
40 DZ	45613712	CRANAPPLE BERRY SEEDS	1.28	51.20
40 DZ	45613712	CRANAPPLE BERRY SEEDS	1.28	51.20
4 PK	65412384	SEED SCRUBBER	888.79	3,555.16
4 PK	65412384	SEED SCRUBBER	888.79	3,555.16
1 PK	65412384	SEED SCRUBBER	888.79	888.79
1 PK	65412384	SEED SCRUBBER	888.79	888.79
12 DZ	84512130	SUB-ARTIC TOMATO SEEDS	3.84	46.08
12 DZ	84512130	SUB-ARTIC TOMATO SEEDS	3.84	46.08

CONTINUED

Page 1

1

THE LAST LEAF		CAMBIUM LAYER LIMITED	
340 DESPERADO COURT		2222 SAPLING CIRCLE	
LONGVIEW		BARKERSVILLE	
CA 12345-6789		BC 47365-7290	
154		31354	11/06/95
TREE TRUCK		11/06/95	12/06/95
		NET 15	MARY PINETREE
951 PK	11005018	EARLY BANTAM SEEDS	.38 361.38
46 PK	11005018	EARLY BANTAM SEEDS	.38 17.48
45 PK	11005018	EARLY BANTAM SEEDS	.38 17.10
4 BX	11057893	AFRICAN DAISY, SEEDS	2.35 9.40
4 BX	11057893	AFRICAN DAISY, SEEDS	2.35 9.40
100 EA	31321655	SEMILLAS DEL SUS SOMBEROS	24.95 2,495.00
100 EA	31321655	SEMILLAS DEL SUS SOMBEROS	24.95 2,495.00
1000 BX	56413213	POT POT	7.65 7,650.00

Thank You
 Because you have ordered
 over \$500 of trees this
 year, on your next stuff
 order you will receive
 a 10% discount.

\$26,882.54
 \$26,882.54

12/06/95

THE LAST LEAF
 340 DESPERADO COURT
 LONGVIEW
 CA 123456789

Page 2

Form Definition and Page Definition Source

Let's first look at several simple examples of formatting the Super Sun Seeds invoicing data. Page and form definitions do not necessarily need to be used together. They can be used independently and in conjunction with printer file options.

SSSFD1—Example of a Form Definition

For example, in following section of code, we have a form definition called SSSFD1 that will create multiple, duplexed pages from each input page of invoice data.

```
000100/* * * * * * * * * * * * * * * * * * * * * * * * * * * */
000200/* Formdef Name: SSSFD1 * */
000300/* * * * * * * * * * * * * * * * * * * * * * * * * * * */
000400FORMDEF SSSFD1 /* SSSFD1 is the form definition */
000500 REPLACE YES /* PPFA should replace existing copy */
000600 DUPLEX NORMAL; /* Print on both sides of the paper */
000700
000800 COPYGROUP F1SEED /* Name of copy group */
000900 CONSTANT BACK;
001000
001100 /* You need to "register" overlays to be used in the copygroup */
001200 OVERLAY INV; /* 01INV - static design; lines, text */
001300 OVERLAY PACK; /* 01PACK - overlay for "PACK" copy */
001400 OVERLAY FILE; /* 01FILE - overlay for "FILE" copy */
001500 OVERLAY CUST; /* 01CUST - overlay for "Customer" copy */
001600 OVERLAY TERMS; /* 01TERMS - Terms and Conditions ovly */
001700 OVERLAY SEED; /* 01SEED - Seed icon/picture */
001800
001900 /* For each page of application data, 3 duplex pages must be */
002000 /* printed: Front side Back side */
002100 /* Page 1 Packing list Blank */
002200 /* Page 2 Customer Copy Terms & Conditions */
002300 /* Page 3 File Copy Blank */
002400 /* ----- Packing List Copy ----- */
002500 SUBGROUP FRONT COPIES 1/* Page 1 FRONT */
002600 OVERLAY INV PACK; /* packlist */
002700 SUBGROUP BACK COPIES 1;/* BACK */
002800 /* ----- Customer Copy ----- */
002900 SUBGROUP FRONT COPIES 1/* Page 2 FRONT */
003000 OVERLAY INV CUST; /* w/prices customer */
003100 SUBGROUP BACK COPIES 1/* BACK */
003200 OVERLAY TERMS; /* Terms and Conditions */
003300 /* ----- "File" Copy ----- */
003400 SUBGROUP FRONT COPIES 1/* Page 3 FRONT */
003500 OVERLAY INV FILE; /* w/prices file copy */
003600 SUBGROUP BACK COPIES 1;/* BACK */
```

This form definition has one copy group (F1SEED) that controls all pages. In the heading information for this copy group, the overlays that will be used in the subgroups—individual pages—are defined. In addition, the term "constant back" is specified to indicate that certain pages will be printed without invoice data. These pages may only contain an overlay.

The subgroups define each of the pages, both front and back sides. For example, on the customer copy duplex page, the invoice data is printed on the front side, along with the invoice overlay (INV) and an overlay (CUST) with customer copy information. On the back side, an invoice terms-and-conditions overlay (TERMS) is printed by itself, without invoice data. This form definition takes one page of input invoice data and creates three physical pages—a packing list, a customer copy, and

a file copy. To implement this application, a change or override to the invoicing printer file is made to include *LINE as the device type and SSSFD1 as the form definition.

SSSPD1—Example of a Page Definition

The page definition reads and formats the actual print line data. Line data differs from SCS print data in that line data contains all of the print lines, including the spacing and skipping lines. In the following example, we show page definition SSSPD1, a simple reformatting of the invoicing print lines.

```

000100/* * * * * * * * * * * * * * * * * * * * * * * * * * * */
000200/* Pagedef Name: SSSPD1 * */
000300/* * * * * * * * * * * * * * * * * * * * * * * * * * * */
000400PAGEDEF SSSPD1 /* SSSPD1 is the page definition name */
000500 REPLACE YES; /* PPFA should replace existing copy */
000600 /* Define font nicknames as follows: */
000700 FONT HELV /* HELV is the short name */
000800 CS H200A0 /* C0H200A0 is character set */
000900 CP V10037; /* T1V10037 is code page */
001000 FONT BOLD 440000; /* Courier Roman Bold 10 Char/Inch */
001100 FONT ITAL 4300B0; /* Courier Italic Normal 12 Char/inch */
001200 FONT NORM 420000; /* Courier Roman Normal 10 Char/inch */
001300 SETUNITS 1 IN 1 IN /* This indicates that the default unit */
001400 /* for all measurements is the inch */
001500 LINESP 6 LPI; /* Lines spacing at 6 lines/inch */
001600
001700 /* * * * * * * * * * * * * * * * * * * * * * * * * * * */
001800 /* All print lines handled by this one page format */
001900 /* * * * * * * * * * * * * * * * * * * * * * * * * * * */
002000
002100 PAGEFORMAT 10F1; /* 10F1 is page format name */
002200
002300 /* Customer Address Block - first 14 lines of page */
002400 PRINTLINE
002500 CHANNEL 1 /* When an input line has a first col. */
002600 /* (CC) '1' value, this PRINTLINE gets */
002700 /* control - meaning: top of a new page */
002800 POSITION 0 0 /* Horiz Pos:0 ; Vert Pos:Down 0" */
002900 FONT BOLD /* Use bold font */
003000 REPEAT 14; /* Process 14 lines this way */
003100
003200 PRINTLINE /* Last line of name and address */
003300 POSITION 0 NEXT /* Horiz Pos:0; Vert Pos:Next line */
003400 FONT BOLD; /* Bold font */
003500 FIELD START 16 /* Parse zip code field out for bar */
003600 LENGTH 5 /* code */
003700 POSITION MARGIN -1 IN /* Postnet bar code at page margin, 1" */
003900 BARCODE /* up from last line position */
004000 TYPE POSTNET; /*
004100
004200 /*
004300 PRINTLINE /* Next 35 lines of page
004400 POSITION 0 NEXT /* Horiz Pos:Margin; Vert Pos:Next line
004500 FONT NORM /* Normal font
004600 REPEAT 35;
004700
004800 /*
004900 PRINTLINE /* Total due line
005000 POSITION 0 NEXT /* Horiz Pos:Margin; Vert Pos: Down Next*/
005100 FONT BOLD; /* Bold font
005200
005300 /*
005400 PRINTLINE /* Last 12 lines of page

```

```

005500      POSITION 0 NEXT      /* Horiz Pos:Margin; Vert Pos:Next Line */
005600      FONT NORM          /* Normal font to be used here      */
005700      REPEAT 12;          /*

```

This page definition reads and prints each of the print lines with the following changes:

- Invoice name and address is printed in bold.
- The zip code field is selected and reprinted in bar code.
- The total line is printed in bold.

Looking at the SSSPD1 page definition, the heading information defines the fonts and line spacing to be used. Note that the prefix "C0" will be added in front of the character set name and the prefix "T1" will be added in front of the code page name. For the font name assigned HELV, the character set C0H200A0 will be used. This set is Helvetica in Roman Medium typeface with a point size of eleven.

This page definition contains one page format. All print lines will be processed by this format. Each input print line maps to a PRINTLINE statement. The first PRINTLINE has a CHANNEL keyword. This means that this PRINTLINE statement will assume control when the input print lines advance to the top of a new page (including the first page). This application has 66 print lines per page, including spacing and skipping, but this doesn't require 66 PRINTLINE statements. The REPEAT keyword enables multiple, successive print lines to be handled by the same PRINTLINE statement.

The first PRINTLINE statement handles the first 14 print lines. This includes the initial 12 blank lines and the first two print lines containing the invoice name and address. These lines are printed in the BOLD font, which is defined as 10-point Courier Bold and is found in character set C0440000. The next PRINTLINE statement handles the name and address print line that contains the US zip code. This print line is also printed in Courier Bold. However, the print line is then parsed (subdefined into individual fields) to define the zip code field. This field is then printed in US Postnet bar code. This bar code is printed at the current horizontal position (MARGIN), but placed one inch above the current vertical position. Therefore, the bar code will print directly above the name and address data just printed.

The remaining PRINTLINE statements handle the rest of the print lines down the page. All of these lines, except for the total due line at line number 51, are printed in the NORM font. The total due line is printed in the font defined as BOLD.

To implement this page definition, the invoice printer file would be changed or overridden to specify *LINE as the device type and SSSPD1 as the page definition name. If the previously described form definition (SSSFD1) was also used, then you would end up with three copies per input page with the line formatting handled by the page definition and the overlays applied as defined by the form definition.

Additional Form Definition and Page Definition Formatting Functions

The page and form definition contained in "Appendix L. Page Definition and Form Definition Source Code for Super Sun Seeds" on page 367 provides for far more formatting function than the page and form definitions just described. Based on the input invoice data, one of the following three output page types would be created:

- Single page invoice
- First or interior page of multi-page invoice

- Last, or summary, page of a multi-page invoice

In order to create the output page type, conditional logic must be defined. Within the page definition (SEEDS), a PRINTLINE statement is parsed in order to look for the words "seeds", "trees", and "fruits" that are found in the "Thank you" message found at the end of each invoice. Locating these words means that we are on the last page of an invoice. In addition, these words are also used as a trigger to place an image of a seed, tree, or fruit on that page.

The page definition has three different PAGEFORMAT records corresponding to the three different output page types. Based on the conditional logic, control is switched dynamically to the correct PAGEFORMAT record. Control passes back to the first PAGEFORMAT record at the top of a new input page (because it contains the CHANNEL keyword). Note that the form definition contains seven copy groups, corresponding to the output page type and which image (seed, tree, or fruit) is required. The selection of the right copy group is defined within the page definition.

Printer File Keyword Support when Using Page Definitions and Form Definitions

With the introduction of line data, the AS/400 can receive layout and media handling instructions through existing Printer File Command keywords and from new page definition and form definition output-descriptors. You must, therefore, describe which keywords are ignored when a page definition or form definition is specified and which keywords are used when no page definition or form definition is specified.

Print File Keywords Ignored when Line Data Is Specified and a Page Definition Is Used

The following printer file keywords are ignored when line data is specified and a page definition is used:

- CDEFNT
- CHRID
- CPI
- FOLD
- FONT
- FNTCHRSET
- LPI
- LVLCHK
- MULTIUP
- PAGESIZE
- PAGRTT
- REDUCE

Print File Keywords Ignored when Line Data Is Specified and a Form Definition Is Used

The following printer file keywords are ignored when line data is specified and a form definition is used:

- BACKMGN
- DRAWER (if *FORMDF is specified)
- DUPLEX (if *FORMDF is specified)

- FOLD
- FORMFEED
- FRONTMGN
- LVLCHK
- MULTIUP
- PAGRTT
- PRTQLTY
- REDUCE

The following printer file keywords, if used, override the values specified in a form definition.

- DRAWER (if *FORMDF is not specified)
- DUPLEX (if *FORMDF is not specified)

Other Options for Page and Form Definitions

You can use different methods to obtain page definitions and form definitions. In this chapter we have shown how you can create page definitions and form definitions with Page Printer Formatting Aid. You can, however, get page definitions and form definitions in other ways. The following list identifies sources for obtaining page definitions and form definitions:

- PSF/400 is shipped with a standard set of precompiled page definitions and form definitions to get you started immediately. The names and characteristics of these resources are included in the accompanying documentation.
- You can create page definition and form definition objects on other AFP platforms, such as MVS, VM, VSE, AIX, and OS/2 (using Business Partner products).
- The IBM Printing Systems Company Solutions Service Center.
- There are several graphical products available for creating page and form definitions interactively. The systems from two companies—ISIS and Elixir—are built on top of form design applications. This enables you to design the electronic form and then format the existing print lines on top of that form.

Note: Contact your IBM representative for more information regarding these options.

Chapter 14. Using the AFP Toolbox for AS/400

The AFP Toolbox provides a high-level, application-programming interface that enables programs written in the C, COBOL, and RPG programming languages to directly produce an AFP data stream. The MO:DCA-P documents created with AFP Toolbox are platform-independent and can be printed or viewed by the IBM AFP Printer Drivers on all supported platforms, such as System/390, AS/400, OS/2, RISC/6000, and AFP Workbench for Windows. AFP Toolbox output can be written to a file or returned to the application for further processing.

AFP Toolbox provides an interface for ILE C, COBOL, and RPG applications.

“Appendix M. Toolbox Source for Super Sun Seeds Case Study” on page 379 shows the COBOL program for the Super Sun Seeds application as it could be implemented with AFP Toolbox function calls.

Tasks You Can Do with the AFP Toolbox

Page definitions provide powerful functions for formatting line data, but may not provide enough flexibility or formatting capabilities for every application. If you need more control of the appearance of your output, you should consider using the AFP Toolbox.

The AFP Toolbox enables you to create new print applications with formatting tailored to the requirements of each page of data. For example, if you created the Super Sun Seeds case study example using AFP Toolbox, you can position rules and fixed or variable depth boxes depending on whether the customer's last order falls on the page or whether the customer has one or many orders.

You also can use a variety of typographic fonts, and include graphics or special messages at different points on each page according to the characteristics of the data. Each statement is designed to most effectively communicate the information needed by the individual customer.

With AFP Toolbox, programmers familiar with the ILE C, COBOL, or RPG programming languages can invoke powerful AFP functions using familiar data structures, function calls, and objects that are easy to learn and understand. These functions enable the programmer to specify and change such AFP formatting options as the following:

- Text position and orientation
- Fonts used for printing lines and fields
- Rules and boxes of varying sizes and positions
- Color for rules, boxes, or fonts
- Page segments, overlays, images, graphics, and bar codes

Formatting with the AFP Toolbox

AFP Toolbox also provides the following formatting capabilities:

- Centering and aligning lines of text using typographic fonts
- Flowing text into a paragraph, which can be left-aligned, right-aligned, centered, or fully justified.

- Querying the width and depth of a string of text before it is actually placed on the page to help the application make decisions about when to break a line or page
- Creating bar code objects (BCOCA)
- Creating graphic objects (GOCA)

AFP Toolbox Document and Page Structure

The AFP Toolbox is designed to hide the details of the data stream from applications that need to generate it.

Applications that use the AFP Toolbox library functions need to follow the AFP hierarchy when building compound documents. Documents are made up of pages and the pages are made up of objects, as shown in Figure 129.

Refer to *IBM Advanced Function Presentation Toolbox for Multiple Operating Systems User's Guide* for a list showing a typical sequence of calls for an application using the AFP Toolbox Library functions.

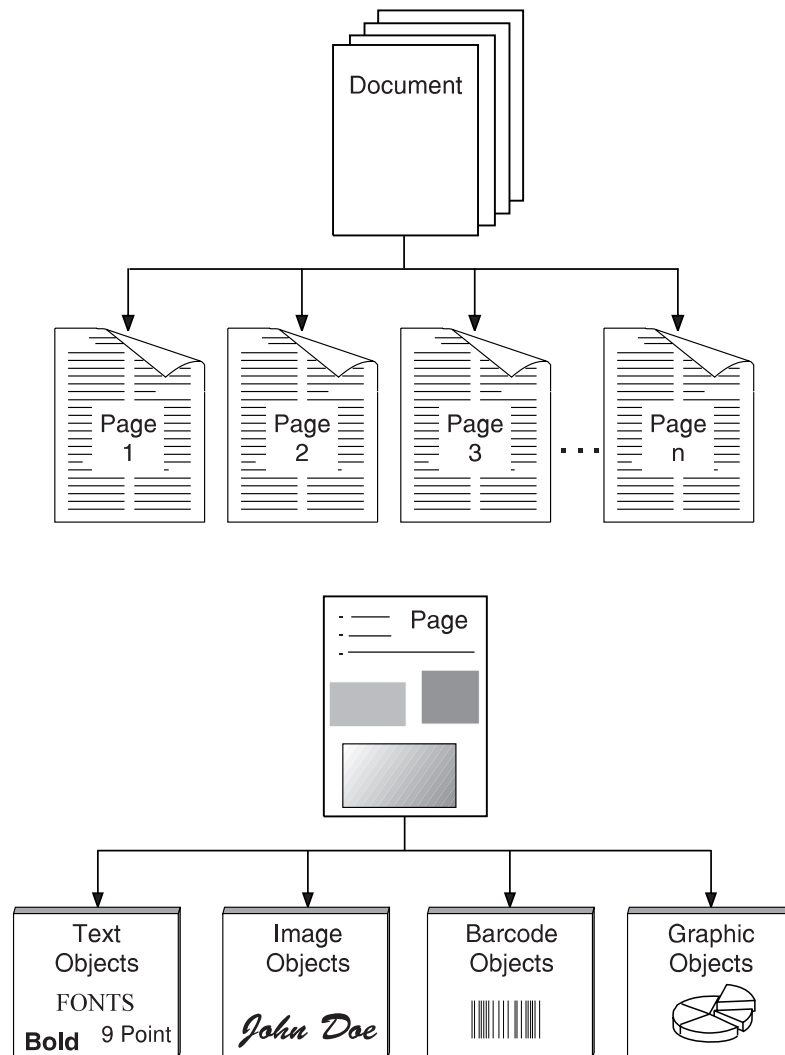


Figure 129. AFP Toolbox Document and Page Structure

RPG programs utilizing the AFP Toolbox are coded in a similar manner to COBOL. "Sample RPG Program using AFP Toolbox" on page 391 contains a simple RPG example.

In summary, use of the AFP Toolbox with a HLL program represents a similar, though more complex, approach to developing AFP applications, when compared to using DDS. The choice of AFP Toolbox would be driven by specific application requirements, such as fully aligned text, that DDS cannot provide.

Refer to *IBM Advanced Function Presentation Toolbox for Multiple Operating Systems User's Guide* (S544-5292) for other examples.

Indexing and Navigation of the AFP Data Stream

AFP Toolbox enables the programmer to add indexing tags to the output document. These tags can be used by the Viewer application of AFP Workbench for Windows to navigate through the document and locate specific pages or groups of pages. The indexing tags also can be used by other applications such as archival and retrieval applications to select and locate specific pages.

Super Sun Seeds Case Study Created with AFP Toolbox

If you created the Super Sun Seeds case study example, as shown below, using AFP Toolbox, you could take advantage of such functions as:

- Variable size boxes
- Alignment of text with typographic fonts
- Counting of pages as they are built
- Creating individualized paragraphs
- Building bar codes

The AFP Toolbox is used in conjunction with a High-Level Language (HLL) program, such as RPG, COBOL, and C, to create documents that are composed of individual pages. Within each page, you can define page elements such as text, image, overlays, lines, boxes, and bar coding. The AFP architecture uses a series of structured fields to represent document and page composition. The AFP Toolbox provides subroutines to be called from a HLL program that handled these structured fields. The application developer focuses on document composition, not the resulting print datastream.

To illustrate the concept described above, let's look at the overall structure of a COBOL program that uses AFP Toolbox subroutines to generate an AFP application. The program flow is as follows:

<i>Set up general parameters</i>	
Perform AFPINIT	(Initialize)
<i>Set up document parameters</i>	
Perform AFPBDOC	(Begin document)
<i>Set up page parameters</i>	
Perform AFPBPAGE	(Begin page)
<i>Set up fonts to be used</i>	
Perform AFPDFNAT	(Define font)
<i>Set up text to be printed</i>	

Perform AFPNLIN	(Line advance)
Perform AFPWRITE	(Write line)
<i>Set up and perform rest of page</i>	
Perform AFPEPAGE	(End Page)
<i>Repeat for all pages</i>	
Perform AFPEDOC	(End Document)
Perform AFPEND	(End Application)

Description of Super Sun Seeds Application with AFP Toolbox

“Appendix M. Toolbox Source for Super Sun Seeds Case Study” on page 379 contains the entire COBOL program using AFP Toolbox subroutines to produce the Super Sun Seeds invoice application. There are several important differences in document formatting with AFP Toolbox support that this example illustrates. These include:

- Typographic fonts can be used throughout, because Toolbox supports left, center, and right alignment of text.
- Boxes surrounding transaction information can be drawn dynamically instead of always being of fixed dimensions.
- Paragraphs of text can be defined and dynamically formatted. The text will be flowed and aligned based on the area of the page allotted for it.
- Page groups (i.e., by customer invoice) can be numbered with pages “n of m.”

Let’s look at several segments of the this Super Sun Seeds program. After initialization, the program sets up overall document information (including the output file name) and performs the begin document operation, as follows:

```
017200000000      MOVE "SUPER SUN SEEDS" TO AFP-DOC-NAME.
017400000000      MOVE "AS/400 COBOL Program" TO AFP-DOC-COMMENT.
017600000000      MOVE FILED TO AFP-OUTPUT-TYPE.
017700960322      MOVE "/QSYS.LIB/QAOCL.LIB/QAYTBRESCS.FILE/SUNSEEDS.MBR"
017800000000      TO AFP-OUTPUT-FILENAME.
018000000000      PERFORM AFPBDOC.
```

Next, the page numbering fields are initialized and the “Begin Page” subroutine is called, as follows:

```
028300000000      MOVE "Page 1" TO AFP-PAGE-NAME.
028500000000      PERFORM AFPBPAGE.
```

Various page elements are composed and placed on the page. An overlay comprising the top part of the invoice page (INVHEAD1) is positioned at a zero-zero offset from the page origin and written to the page, as follows:

```
030300000000      *-----*
030400000000      * INCLUDE THE OVERLAY                                *
030500000000      *-----*
030600000000      MOVE 0 TO AFP-X-COORDINATE.
030700000000      MOVE ABSOLUTE-POS TO AFP-X-REF-COORD-SYS.
030800000000      MOVE 0 TO AFP-Y-COORDINATE.
030900000000      MOVE ABSOLUTE-POS TO AFP-Y-REF-COORD-SYS.
031000000000      PERFORM AFPSPPOS.
031100000000
031200000000      MOVE "INVHEAD1" TO AFP-OVLY-NAME.
031300000000      PERFORM AFPIOVL.
031400000000
031500000000      PERFORM PROCESS-THE-ADDRESS.
031600000000
031700000000      *-----*
```

```

031800000000      * Start vertical rules under the shaded box      *
031900000000      *-----*
032000000000          MOVE 10 TO AFP-RULE-FAT-THICKNESS.
032100000000          MOVE BASELINE-DIR TO AFP-DIRECTION.
032200000000
032300000000          MOVE 793 TO AFP-X-COORDINATE.
032400000000          MOVE ABSOLUTE-POS TO AFP-X-REF-COORD-SYS.
032500000000          MOVE 5442 TO AFP-Y-COORDINATE.
032600000000          MOVE ABSOLUTE-POS TO AFP-Y-REF-COORD-SYS.
032700000000      PERFORM AFPSPPOS.
032800000000      PERFORM AFPBRULE.
032900000000          SET RULEHNDL1 TO AFP-RULE-HANDLE.
033000000000          MOVE 850 TO AFP-X-COORDINATE.
033100000000      PERFORM AFPHMOVE.
033200000000      PERFORM AFPBRULE.
033300000000          SET RULEHNDL2 TO AFP-RULE-HANDLE.
033400000000          MOVE 567 TO AFP-X-COORDINATE.
033500000000      PERFORM AFPHMOVE.
033600000000      PERFORM AFPBRULE.
033700000000          SET RULEHNDL3 TO AFP-RULE-HANDLE.
033800000000          MOVE 1474 TO AFP-X-COORDINATE.
033900000000      PERFORM AFPHMOVE.
034000000000      PERFORM AFPBRULE.
034100000000          SET RULEHNDL4 TO AFP-RULE-HANDLE.
034200000000          MOVE 4505 TO AFP-X-COORDINATE.
034300000000      PERFORM AFPHMOVE.
034400000000      PERFORM AFPBRULE.
034500000000          SET RULEHNDL5 TO AFP-RULE-HANDLE.
034600000000          MOVE 1304 TO AFP-X-COORDINATE.
034700000000      PERFORM AFPHMOVE.
034800000000      PERFORM AFPBRULE.
034900000000          SET RULEHNDL6 TO AFP-RULE-HANDLE.
035000000000          MOVE 1500 TO AFP-X-COORDINATE.
035100000000      PERFORM AFPHMOVE.
035200000000      PERFORM AFPBRULE.
035300000000          SET RULEHNDL7 TO AFP-RULE-HANDLE.

```

The program reads data from the input file and begins filling in the page. The customer name and address is written using a series of new lines (AFPNEWLINE) and writes (AFPWRITE). This text is left aligned:

```

048400000000      PERFORM AFPNEWLINE.
048500000000      CALL "TRIM" USING CUST-NAME,
048600000000          BY CONTENT LENGTH OF CUST-NAME,
048700000000          BY REFERENCE AFP-CHARACTER-STRING,
048800000000          AFP-STRING-LENGTH.
048900000000
049000000000          ADD 1 TO AFP-STRING-LENGTH.
049300000000          MOVE LEFT-ALIGN TO AFP-ALIGNMENT-OPTION.
049400000000          MOVE TRU TO AFP-POSITION-OPTION.
049500000000      PERFORM AFPWRITE.
049600000000
049700000000      *-----*
049800000000      * Write the customer address.      *
049900000000      *-----*
050000000000          PERFORM AFPNEWLINE.
050100000000
050200000000      CALL "TRIM" USING CUST-ST-ADDR,
050300000000          BY CONTENT LENGTH OF CUST-ST-ADDR,
050400000000          BY REFERENCE AFP-CHARACTER-STRING,
050500000000          AFP-STRING-LENGTH.
050600000000
050700000000          ADD 1 TO AFP-STRING-LENGTH.
051000000000          MOVE LEFT-ALIGN TO AFP-ALIGNMENT-OPTION.
051100000000          MOVE TRU TO AFP-POSITION-OPTION.
051200000000      PERFORM AFPWRITE.
051300000000

```

```

051400000000    PERFORM AFPNLINE.
051500000000
051600000000    CALL "TRIM" USING CUST-CITY-STATE,
051700000000                BY CONTENT LENGTH OF CUST-CITY-STATE,
051800000000                BY REFERENCE AFP-CHARACTER-STRING,
051900000000                AFP-STRING-LENGTH.
052000000000
052100000000    ADD 1 TO AFP-STRING-LENGTH.
052300000000    MOVE LEFT-ALIGN TO AFP-ALIGNMENT-OPTION.
052400000000    MOVE TRU TO AFP-POSITION-OPTION.
052500000000    PERFORM AFPWRITE.
052600000000
052700000000    PERFORM AFPNLINE.

```

Other invoice data, such as account number and invoice number is positioned and right-aligned within the page:

```

038000000000    MOVE 2254 TO AFP-X-COORDINATE.
038100000000    MOVE ABSOLUTE-POS TO AFP-X-REF-COORD-SYS.
038200000000    MOVE 4335 TO AFP-Y-COORDINATE.
038300000000    MOVE ABSOLUTE-POS TO AFP-Y-REF-COORD-SYS.
038400000000    PERFORM AFPSPPOS.
038500000000
038600000000    MOVE ACCOUNT-NUM-IN TO ACCOUNT-NUM-OUT.
038700000000    MOVE 4 TO AFP-STRING-LENGTH.
038800000000    MOVE ACCOUNT-NUM-OUT TO AFP-CHARACTER-STRING.
039000000000    MOVE RIGHT-ALIGN TO AFP-ALIGNMENT-OPTION.
039100000000    MOVE FALS TO AFP-POSITION-OPTION.
039200000000    PERFORM AFPWRITE.
039300000000
039400000000    MOVE 3121 TO AFP-X-COORDINATE.
039500000000    PERFORM AFPHMOVE.
039600000000
039700000000    MOVE INVOICE-NUM-IN TO INVOICE-NUM-OUT.
039800000000    MOVE 8 TO AFP-STRING-LENGTH.
039900000000    MOVE INVOICE-NUM-OUT TO AFP-CHARACTER-STRING.
040100000000    MOVE RIGHT-ALIGN TO AFP-ALIGNMENT-OPTION.
040200000000    MOVE TRU TO AFP-POSITION-OPTION.
040300000000    PERFORM AFPWRITE.

```

As the invoice transaction data is placed down the page, the "frame" of lines surrounding that information is progressively extended down the page:

```

065300000000    MOVE TRANS-UOM TO AFP-CHARACTER-STRING.
065400000000    MOVE 2 TO AFP-STRING-LENGTH.
065600000000    MOVE CENTER-ALIGN TO AFP-ALIGNMENT-OPTION.
065700000000    MOVE TRU TO AFP-POSITION-OPTION.
065800000000    PERFORM AFPWRITE.

```

A key capability of AFP Toolbox is the ability to "flow" text like a word processing program. The space for a paragraph is defined and the text is positioned and aligned within that space as shown in the program statement below:

```

057900000000    *-----*
058000000000    * If there is room, build a personalized paragraph.      *
058100000000    *-----*
058200000000    PERFORM AFPQUERY.
058300960322    IF AFP-Y-COORDINATE < 8000
058400000000
058500960322    MOVE 4040 TO AFP-PARA-WIDTH
058600960322    MOVE JUSTIFY-ALIGN TO AFP-FORMAT-OPTION
058700960322    MOVE DEFAULT-LSP TO AFP-LINE-SPACING
058800960322    MOVE 10000 TO AFP-PARA-MAXDEPTH
058900960322    PERFORM AFPBPARA
059000000000
059100960322    MOVE LOW-VALUES TO AFP-CHARACTER-STRING
059200960322    STRING AFP-STRING-1

```


059300960322	DELIMITED BY SIZE INTO AFP-CHARACTER-STRING
059400960322	CALL "STRING-LENGTH" USING AFP-CHARACTER-STRING,
059500000000	BY CONTENT LENGTH OF AFP-CHARACTER-STRING,
059600960322	BY REFERENCE AFP-STRING-LENGTH
059700960322	ADD 1 TO AFP-STRING-LENGTH
060000960322	PERFORM AFPPTXT
060100000000	
060200960322	CALL "TRIM" USING CUST-NAME,
060300000000	BY CONTENT LENGTH OF CUST-NAME,
060400000000	BY REFERENCE AFP-CHARACTER-STRING,
060500960322	AFP-STRING-LENGTH
060600000000	
060700960322	ADD 1 TO AFP-STRING-LENGTH
061000960322	PERFORM AFPPTXT
061100000000	
061200960322	MOVE LOW-VALUES TO AFP-CHARACTER-STRING
061300960322	STRING AFP-STRING-2
061400960322	DELIMITED BY SIZE INTO AFP-CHARACTER-STRING
061500960322	CALL "STRING-LENGTH" USING AFP-CHARACTER-STRING,
061600960322	BY CONTENT LENGTH OF AFP-CHARACTER-STRING,
061700960322	BY REFERENCE AFP-STRING-LENGTH
061800960322	ADD 1 TO AFP-STRING-LENGTH
062100000000	
062200960322	PERFORM AFPPTXT
062300960322	PERFORM AFPEPARA
062400960322	END-IF.

Chapter 15. Using the Print Format Utility

The Print Format Utility, along with the Overlay Utility and the Resource Management Utility, is part of the IBM Advanced Function Printing Utilities for AS/400 (AFP Utilities). This chapter describes the Print Format Utility and how to use it.

Introduction to the Print Format Utility

The Print Format Utility allows you to print data from database file members (created by application programs or utilities) in various forms, such as text or bar codes, and in various formats on IPDS printers. You can also print summary information of the data in the database member, such as the total, average, or maximum of numeric fields. You can specify these items when designing your printout on the screen interactively and you can place images on the printed page as well.

With Print Format Utility, you can:

- Design your desired layout of a record interactively in the same way as the Overlay Utility.
You can define headings, boxes, or logos that contain text, lines, images, bar codes, and graphics to be printed in addition to the data in the database file member.
- Design the page layout interactively in the same way as in the Overlay Utility.
You can define headings, boxes, or logos that contain text, lines, boxes, images, bar codes, and graphics to be printed.
- Save the record layout and page layout as a printout format definition in your file.
- Print a database file member according to the printout format definition.

With Print Format Utility, you can also create various kinds of output from one database file member. For example, you can print a list of products, product descriptions, or even delivery labels from one database file member using different printout format definitions.

With AFP Utilities, Version 4 Release 4, selective printing of any element in a record layout can be done by using **Element Selection**. Selection is determined by the values of one to five variable fields in the database file being printed. To use the function, press F9=Element selection on any of the following screens and specify the conditions under which the element should be printed:

- Define text
- Change text
- Define line
- Change line
- Define box
- Change box
- Define bar code
- Change bar code
- Place graphics
- Change graphics
- Place page segment

- Change page segment

Defining a Printout Format Definition (PFD Definition)

With AFP Utilities, the forms and formats for printing are designed by defining a printout format definition (PFD definition) instead of writing your own application programs.

Case Study Related Example with Print Format Utility

Although Print Format Utility could be adapted to print a version of the Super Sun Seeds invoice, it is better suited to a related application: packing list bar coded labels. This application would create a label for each line item in a Super Sun Seeds customer order. Labels would be peeled off during order selection, and the bar code scanned to confirm the item selection. The labels are printed 3-up and up to 30 per 8-1/2 by 11 inch page. A sample of the order labels is shown below:

ARBOLES DEL SUR uom EA pcs 1 wt 010.0 prc \$45.00 SONIC SEEDS cls T 00001200 4-L-31 Bin Location	LASO RED SEEDS uom CT pcs 48 wt 000.9 prc \$892.23 WHOLESALE SEEDS cls S 11005011 09-658 Bin Location	SCARLET NANTES SEEDS uom DZ pcs 12 wt 001.1 prc \$5.90 SONIC SEEDS cls S 11005014 09-489 Bin Location
CHANTENAY SEEDS uom BZ pcs 13 wt 001.8 prc \$2.19 SOMERS SUPPLY cls A 11005015 09-14 Bin Location	EARLY BANTAM SEEDS uom PK pcs 24 wt 005.7 prc \$.38 NATURE MIDDITS cls S 11005018 C-2-12 Bin Location	AFRICAN DAISY SEEDS uom BX pcs 24 wt 001.0 prc \$2.35 SLIPPERY SEEDS cls B 11057893 B-3-99 Bin Location
SEMILLAS DEL SUS SOMBEROS uom EA pcs 1 wt 020.0 prc \$24.95 HORTICULTÉ HATS cls S 31321655 3-4-87 Bin Location	POT POT uom BX pcs 60 wt 003.1 prc \$7.65 SEEDS MASTERS cls B 56413213 V-AD-1 Bin Location	OREGON SPRING TOMATO SEED uom PK pcs 12 wt 001.2 prc \$.97 WHOLESALE SEEDS cls S 84512023 7-4-96 Bin Location

Figure 130. Order Label Printout

Since PFU works directly with the AS/400 database, we have created an expanded customer invoice file that joins the invoice file (SEEDDETL) and the item master file (SEEDITEM). This allows both invoice and item master information to be passed to PFU with each record processed. The specification for this joined file (SEEDJOIN) is shown below:

```

SOURCE FILE . . . . . SAMPLER/QDDSSRC
MEMBER . . . . . SEEDJOIN
SEQNBR*...+... 1 ...+... 2 ...+... 3 ...+... 4 ...+... 5 ...+... 6 ...+... 7 ...+... 8
100      A* Super Sun Seeds Invoice/Item Join LF
200      A          R ITMALL                      JFILE(SEEDDETP SEEDITEM)
300      A          J                          JOIN(SEEDDETP SEEDITEM)
400      A                                          JFLD(ITM1 ITEM#)
500      A* SEEDDETP FIELDS
600      A          RECNO                      4S 0      COLHDG('Record' 'Number')
700      A                                          TEXT('Record Number')
800      A          DELETE                      1A        COLHDG('Delete')
900      A                                          TEXT('Delete Code (D)')
1000     A          CUST#                      6S 0      COLHDG('Customer' 'Number')
1100     A                                          TEXT('Customer Number')
1200     A          STNAME                      25A       COLHDG('SHIP-TO NAME')
1300     A                                          TEXT('SHIP-TO-NAME')
1400     A          STSTRT                      25A       COLHDG('SHIP STREET')
1500     A                                          TEXT('SHIP STREET')
1600     A          STCITY                      25A       COLHDG('SHIP CITY')
1700     A                                          TEXT('SHIP CITY')

```

1800	A	STSTE	2A	COLHDG('ST')
1900	A			TEXT('STATE ADDR')
2000	A	STZIP	9S	COLHDG('ZIP')
2100	A			TEXT('ZIP+4')
2200	A			EDTWRD(' - ')
2300	A	SHPVIA	10A	COLHDG('SHIP VIA')
2400	A			TEXT('SHIP VIA')
2500	A	TERMS	10A	COLHDG('TERMS')
2600	A			TEXT('TERMS')
2700	A	QTY1	4S 0	COLHDG('QTY01')
2800	A			TEXT('QTY01')
2900	A	ITM1	8S 0	COLHDG('ITM01')
3000	A			TEXT('ITM01')
3100	A*	SEEDITEM FIELDS		
3200	A	ITMDEL	1A	COLHDG('DELETE CODE')
3300	A			TEXT('DELETE CODE')
3400	A	ITMDES	25A	COLHDG('ITEM DESCRIPTION')
3500	A			TEXT('ITEM DESCRIPTION')
3600	A	ITMCLS	1A	COLHDG('ITEM' 'CLASS')
3700	A			TEXT('ITEM CLASS')
3800	A	SHPCDE	1A	COLHDG('SHIP' 'CODE')
3900	A			TEXT('SHIP CODE')
4000	A	UOM	2A	COLHDG('UNIT OF' 'MEAS')
4100	A			TEXT('UNIT OF MEASURE')
4200	A	PCSUOM	2A	COLHDG('PCS/' 'UOM')
4300	A			TEXT('PIECES/UOM')
4400	A	WHSLOC	6A	COLHDG('WHSE' 'LOC')
4500	A			TEXT('WAREHSE LOC')
4600	A	WEIGHT	4S 1	COLHDG('#WEIGHT')
4700	A			TEXT('#WEIGHT')
4800	A	COST	6S 2	COLHDG('COST')
4900	A			TEXT('ITEM COST')
5000	A	SELPRC	6S 2	COLHDG('SELL' 'PRICE')
5100	A			TEXT('SELLING PRICE')
5200	A			EDTWRD(' , \$0. ')
5300	A	UTSLY	6S 0	COLHDG('UNITS' 'LST YR')
5400	A			TEXT('UNITS LAST YEAR')
5500	A	\$YTDLY	7S 2	COLHDG('SALES' 'LAST YEAR')
5600	A			TEXT('SALES LAST YEAR')
5700	A	UTYTD	6S 0	COLHDG('UNITS' 'YTD')
5800	A			TEXT('UNITS YR-TO-DTE')
5900	A	\$YTD	7S 2	COLHDG('SALES' 'YTD')
6000	A			TEXT('SALES YR-TO-DATE')
6100	A	SUPLR1	15A	COLHDG('SUPPLIER 1')
6200	A			TEXT('SUPPLIER 1')
6300	A	SUPLR2	15A	COLHDG('SUPPLIER 2')
6400	A			TEXT('SUPPLIER 2')
6500	A	DTESAL	6S	COLHDG('LSTSAL')
6600	A			TEXT('LAST SALE')
6700	A	DTESHP	6S	COLHDG('LSTSHP')
6800	A			TEXT('LAST SHIP')
6900	A	K CUST#		
7000	A	K ITM1		

* * * * * E N D O F S O U R C E * * * * *

PFU builds a print definition, or PFD, that defines how information from the database file will be merged with other output elements (such as text, page segments, overlays, and bar code). PFU defines a record layout and a page layout. The record layout defines the composition of one database record. In this example, each record is a line item within a customer invoice. The page layout defines how one or multiple record layouts are positioned on the page. This can be done through a one-to-one relationship, or as in this case, we can place up to 30 records or labels on a page.

```

AFPU      IBM Advanced Function Printing Utilities for AS/400

Select one of the following:

Overlay Utility
  1. Work with source overlays
  2. Work with source overlay files

Print Format Utility
  11. Work with PFD definitions
  12. Work with PFD definition files
  13. Print database file member
  14. Print AFP Utilities tutorial

Resource Management Utility
  21. Convert to page segment
  22. Work with overlays
  23. Work with page segments

Selection or command
==> 11
F3=Exit   F4=Prompt   F9=Retrieve   F12=Cancel   F16=System main menu

```

Figure 131. AFP Utilities Main Menu

From the AFP Utilities main menu, options 11-14 are Print Format Utility functions. Since Print Format Utility can “compose” output that includes overlays and page segments, you could use Overlay Utility and Resource Management Utility to build and manage those resources. We select option “11” to build a print definition.

```

                                Work with PFD Definitions

File . . . . . QPFDDEF      Name, F4 for list
Library . . . . . SAMPLER    Name, *LIBL, *CURLIB
PFD definition . . . . . *ALL  Name, generic*, *ALL
Position to . . . . .        Starting characters

Type options, press Enter.
  1=Create  2=Change  3=Copy  4=Delete  6=Print PFD definition  7=Rename
  9=Print database file

      PFD
Opt Definition Text                      Changed
  2  ITEM LBL      Order Labels for Super Sun Seeds      03/01/96
     SHLFLBL      Shelf Label for Seed Items              03/01/96
                                           Bottom

Parameters or command
==>
F3=Exit   F4=Prompt   F5=Refresh   F9=Retrieve   F11=Display names only
F12=Cancel

```

Figure 132. Work with PFD Definitions Display

From the “Work with PFD Definitions” display, we select option “2” to change a definition called “ITEMLBL” for the Super Sun Seeds item labels.

```

Change PFD Definition

File . . . . . : QPFDDEF
Library . . . . . : SAMPLER
PFD definition . . . . . : ITEMLBL

Type options, press Enter.
1=Select

Opt      Action
         Define PFD specifications
         Work with PFD definition fonts
1        Specify database file
1        Specify break fields
1        Design record layout
1        Design page layout
         Specify record selection
         Define printout specifications
         Specify mapping object name

F3=Exit   F5=Refresh   F9=Select all   F12=Cancel

```

Figure 133. Change PFD Definition Display

The main selection screen shows the options that can be used in building the application. We have selected the options to specify the database file, define break fields, design record layout, and design page layout.

```

Specify Database File

Type choices, press Enter.
Database file . . . . . SEEDJOIN      Name, F4 for list
Library . . . . . SAMPLER           Name, *LIBL, *CURLIB
Record format . . . . . ITMALL       Name, *FIRST, F4 for list

F3=Exit   F4=Prompt   F5=Refresh   F12=Cancel

```

Figure 134. Specify Database File Display

We select SEEDJOIN as the target database file for this application.

Control . . .		Design Record Layout		Columns: 1- 74
		PFD Definition ITEM LBL		
		*...+...1...+...2...+...3...+...4...+...5...+...6...+...7...		
001	*B001	-----*T010	&CUST#.	
002	:	*T002	S.	:
003	:	*T005	OM. pcs &PCSUOM. wt &WEIGHT. prc &SELPRC.	:
004	:	*T007	1. *T009 TMCLS.	:
005	:		*C003	:
006	:	&*T008	cation	:
007	+	-----+		
008				
009				
010				
011				
012				
013				
014				
015				
016				
017				
				More...
F3=Exit	F6=Text	F9=Line	F10=Box	
F11=Bar code	F21=Element edit	F22=Block edit	F24=More keys	

Figure 135. Design Record Layout Display

The “Design Record Layout” display shows the layout of a record (a label) in screen view mode. Design elements include text, bar code, lines, boxes, page segments, and database fields. Fields from the database are specified by using a “&” prefix and “.” suffix. For example, the specification “&WEIGHT;” is the field WEIGHT.

When you press F4, the Change Text Detail screen is displayed.

Change Text Detail			
Mark:	*T005	Measurement method:	Inch
Type choices, press Enter.			
Position:			
Across . . . . .	.20	0.00-22.75	
Down . . . . .	.40	0.00-22.75	
Text data	uom &UOM.	pcs &PCSUOM.	wt &WEIGHT. prc &SELPRC.
		F4 for list	
Element		Name	
Format	1	1=Horizontal, 2=Vertical	
Degree of rotation	0	0, 90, 180, 270	
Color	*DEFAULT	*DEFAULT, 1=Blue, 2=Red	
		3=Magenta, 4=Green, 5=Cyan	
		6=Yellow, 7=Brown, 8=Black	
Underline	N	Y=Yes, N=No	
More...			
F3=Exit	F4=Prompt	F5=Refresh	F6=Change measurement method
F10=Edit numeric	F12=Cancel		

Figure 136. Change Text Detail Display

This displays the detail of the text line positioned at .20 inch down and .40 across. This text line contains both constant data (“uom”) and fields from the database (“&uom;”). A continuation display prompts for the font to be used in printing the text and fields.

Design Record Layout									
Control . .				PFD Definition ITEM LBL					
NBR	ID	NAME	M	ACROSS	DOWN	Parameters			
001	B		2	0.000	0.000	END ACROSS= 2.660 END DOWN = 1.000			
002	T		1	3	2	FONT = 0 &ITMDES.			
003	C		2	1.400	0.660	&ITM1.			
004	T		2	0.100	0.850	FONT=0 &WHSLOC.			
005	T		2	0.200	0.400	FONT=0 uom &UOM. pcs &PCSUOM. wt &WEIGHT. prc			
006	T		2	1.700	0.570	FONT=0 &ITM1.			
007	T		2	0.200	0.500	FONT=0 &SUPLR1;			
008	T		2	0.250	0.980	FONT=0 Bin Location			
009	T		2	1.300	0.500	FONT=0 cls &ITMCLS.			
010	T		2	2.000	0.150	FONT=0 Cust#: &CUST.#;			
011									
012									
013									
014									
015									
016									
									More...
F3=Exit		F6=Text		F9=Line		F10=Box			
F11=Bar code		F13=Place		F14=Change		F24=More keys			

Figure 137. Design Record Layout Display

The Design Record Layout screen, with design elements of the label, can also be displayed in list view, as shown above. This view not only gives a summarized listing, but also facilitates line commands on specific elements (such as move, copy, remove, and restore). You can also change an item by placing the cursor on the desired line and pressing PF14.

Design Page Layout									
Control . .				PFD Definition ITEM LBL					
				Columns: 1- 74					
				*...+....1....+....2....+....3....+....4....+....5....+....6....+....7....					
001	*R001-001				*R001-002			*R001-003	
002									
003									
004									
005									
006									
007	*R001-004				*R001-005			*R001-006	
008									
009									
010									
011									
012									
013	*R001-007				*R001-008			*R001-009	
014									
015									
016									
017									
									More...
F3=Exit		F6=Text		F9=Line		F10=Box			
F11=Bar code		F21=Element edit		F22=Block edit		F24=More keys			

Figure 138. Design Page Layout Display

With the “Design Page Layout” display, you can place one or more copies of the record layout on the page. Each record layout is filled by variable data from an individual record in the selected database file. With the Super Sun Seeds item labels, we want to use 8-1/2 by 11 inch label stock and position labels three across and ten deep. If we select the first record layout, we can see the record positioning.

Change Record Layout Detail

Mark: *R001 Measurement method: Inch

Type choices, press Enter.

Position:

Across . . . . .	.02	0.00-22.75
Down . . . . .	.00	0.00-22.75

Element Name

Direction 1 1=Across, 2=Down

Repetition:

Across	3	1-99
Down	10	1-99

Distance:

Across	2.74	0.00-22.75
Down	1.07	0.00-22.75

F3=Exit F4=Prompt F5=Refresh F6=Change measurement method F12=Cancel

Figure 139. Change Record Layout Detail Display

This display shows that the record layout is replicated three across and ten down.

Summary

As you can see, Print Format Utility is very similar in format and interface to Query for AS/400. Unlike Query, PFU creates AFP pages, not simple reports. PFU's ability to define "subpages" and then replicate those segments across and down a physical page makes it appropriate for use with applications such as multiple-up barcoded labels. In addition, since PFU works directly with a database file, it can be used for one-time or ad hoc reports and documents.

Chapter 16. Using the Client Access/400 AFP Viewer

Advanced Function Presentation

The use of the term *Advanced Function Presentation* for AFP indicates the extension of AFP architecture and support beyond printing. AFP creates documents that need to be viewed, faxed, merged with scanned information, indexed, and archived, in addition to be printed.

The AFP Workbench Viewer provides the capability to resolve and view graphically AFP documents. It can also view other printed formats, such as SCS and ASCII, as well as a number of image file formats. Once viewed on the client, a document or image can be annotated, reprinted, or faxed from the client. The AFP Workbench Viewer is integrated into Client Access/400.

Summary of View-Related Applications

The ability to view a fully composed AFP document on a PC screen offers many advantages:

- Increased end-user productivity
 - Allows you to proof your output before printing it
 - Allows you to view information online instead of printing it
- Reduced paper use
 - Saves money by purchasing less paper
 - Is environmentally friendly
- Enhanced customer service
 - Allows a customer service representative to immediately access a customer statement online
 - Provides a view of the complete customer statement just as it was printed

Many AS/400 applications now take advantage of the AFP Workbench Viewer so their output may easily be viewed by users at intelligent workstations.

- Client Access/400 now includes a subset of the AFP Workbench Viewer. This provides all users with a graphical interface that allows them to see a list of AS/400 spooled files. Double-clicking on any item in the list invokes the AFP Workbench Viewer, and brings up an image of that document on the PC display.
- Facsimile Support for AS/400 uses the AFP Workbench Viewer to display incoming fax documents.
- OnDemand for AS/400 supports the archival and retrieval of AFP and SCS documents. OnDemand can be used to display documents that have been retrieved.

Designed for high volume, customer service environments, OnDemand for AS/400 provides hierarchical storage management across magnetic, optical, and tape devices. The OnDemand server allows indexes such as customer name and account number to be created and stored for AFP files, giving the user quick and simple navigation through thousands of statements.

- ImagePlus/400 and Workfolder Application Facility (WAF) generate image documents on the AS/400. These documents can be viewed using the AFP Workbench Viewer.

- IBM EDMSuite OnDemand for AIX provides archival and retrieval of AFP formatted documents, as well as line-mode and image documents, much like OnDemand for AS/400.

AS/400 applications that require indexing, archival, and retrieval of a high volume of AFP documents can route their output to an OnDemand for AIX server for these functions.

Client Access/400 Viewer Details

AFP Workbench Viewer functions are available to all Client Access/400 clients.

You can view OS/400 spooled files, as well as documents in shared folders, on a LAN, or on a PC. The standard PC file types are supported (TIFF, PCX, DCX, DIB, GIF). Also you can print the document on a locally attached printer, clip portions of a document to create new documents, use the IBM AFP Printer Driver for Windows to create AFP documents from PC applications, and annotate documents.

The following functions are part of the AFP Workbench:

- Client management of OS/400 spooled files
- View AFP, SCS, and ASCII files
- View TIFF, PCX, DCX, and DIB image files
- Attach notes (annotation) to a displayed document
- Copy selected pages to a file
- Create AS/400 overlays and page segments from any Windows application
- Print viewed document or image
- Search spooled file for target keywords
- Select and copy data to clipboard
- Print (or any print driver operation, such as fax)
- View controls, including zoom, page rotation, etc.

AFP External Resources

A typical AFP document is "architected" with references to external page elements such as fonts, overlays, and images (page segments). The Client Access/400 AFP Viewer graphically displays the entire document, including these external elements.

Overlays and Page Segments

Viewing AS/400 Spooled Files with Client Access/400

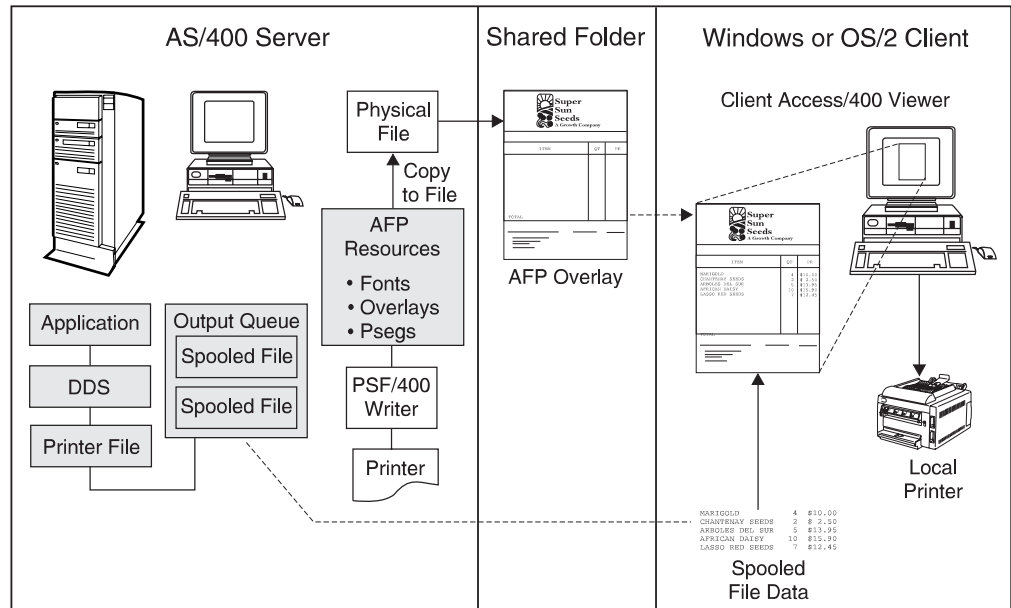


Figure 140. Viewing AS/400 Output Using Client Access/400

In order to understand this process, consider the case study of the Super Sun Seeds Invoice. When that job is a spooled file in an output queue, it contains references to page segments (Super Sun Seeds logo, and others like the strawberry, tree, and flower). It also contains references to several different AFP overlays (the different variations of the invoice form). These resources are not “inline” with the spooled file; they are simply referenced by the spooled file. If this job is released to an IPDS, AFP(*YES) printer, PSF/400 gathers all the resources and sends them to the printer along with the spooled file.

For Windows 95 and Windows NT clients of Client Access, the spooled file is sent along with the externally-referenced overlays and page segments. For OS/2 and Windows 3.1 clients, these resources must be available in a shared folder or PC file directory. If these resources are not already available within a shared folder or PC file directory, they must be copied there. Detailed instructions for copying overlays and page segments can be found in “Appendix C. Setting Up the Client Access/400 Viewer to View AFP Resources” on page 309.

Fonts

The AFP Workbench Viewer uses PC-resident fonts to display documents. This means that the font used in the AS/400 document will be matched as closely as possible with a font available on the PC when the document is displayed with the AFP Workbench Viewer.

By default, the PC uses True Type fonts, which are included with Windows. If the PC also has Adobe Type Manager (ATM) fonts installed and active, the AFP Workbench Viewer uses these fonts to display documents. ATM must be purchased separately from the AFP Workbench Viewer.

For best fidelity when viewing AFP documents, you should use IBM Expanded Core fonts when creating a document, have ATM on your PC, and obtain the AFP Expanded Core Type 1 fonts for your PC. ATM Version 3.02 or higher is recommended. (ATM 3.0 or higher is needed for Windows 95. ATM NT is needed for Windows NT.) The Type 1 Expanded Core fonts for PC are available in the IBM AFP Font Collection product (5648-113) or by contacting the IBM Support Center and placing a request on the AFP Workbench queue.

AFP Data Types Not Supported by the AFP Workbench Viewer

The following types of AFP data are not supported by the AFP Workbench Viewer:

- Bar Code Object Content Architecture (BCOCA)
- Spooled files associated with a page definition, which may not display correctly

Using Client Access/400 to View Spooled Files

Follow this procedure to use Client Access/400 to view spooled files on your PC screen.

Note: These instructions are for a Windows 95 or Windows NT environment. For OS/2 instructions, see Client Access/400 for OS/2 documentation and online help.

1. Open the Client Access/400 Window.

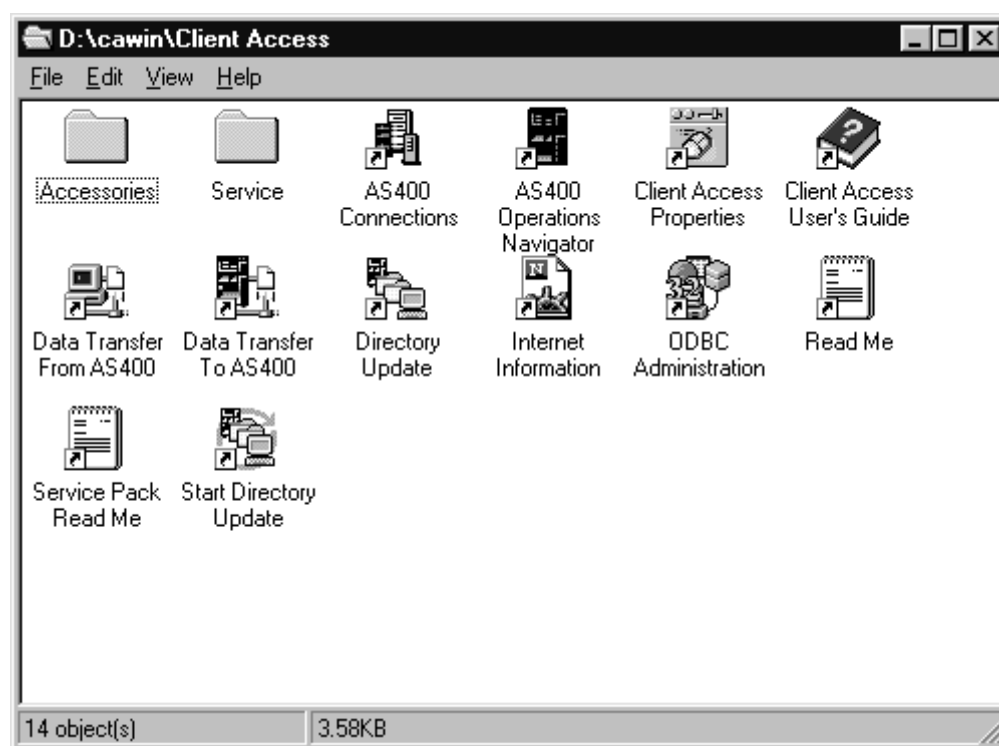


Figure 141. Client Access/400 Window

2. Double-click on the AS/400 Operations Navigator icon (called System Object Access in Windows 3.1). You will see icons representing various AS/400 system information that can be accessed from the PC client.

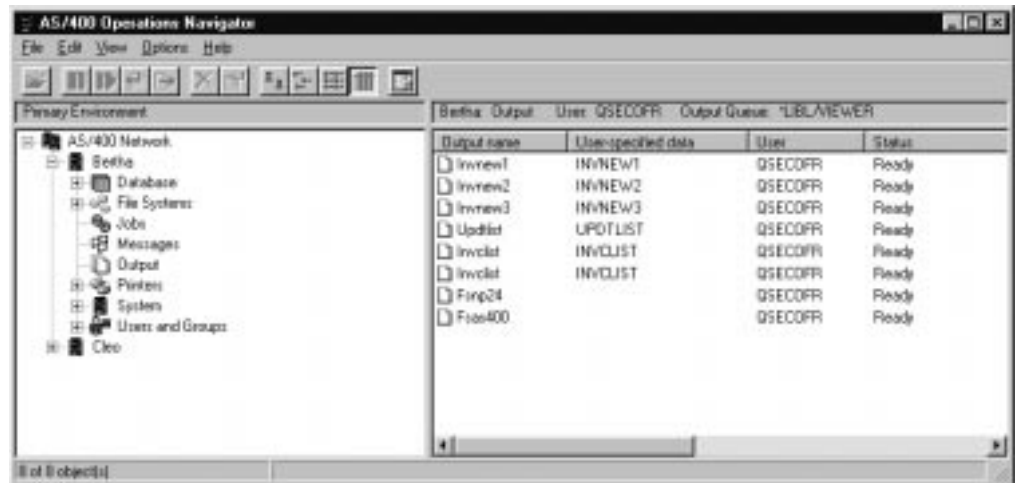


Figure 142. Operations Navigator Window

3. Double-click on the Output icon. This displays a list of AS/400 spooled files. This is the same information that would be displayed on the AS/400 using the WRKSPFL command, but it is presented in an easy to use graphical format.
4. You can customize the information that appears in the Output List. Select View on the title bar of the Printer Output List window, and then select Columns. From here you can select which columns of information you want to see, and in what order.

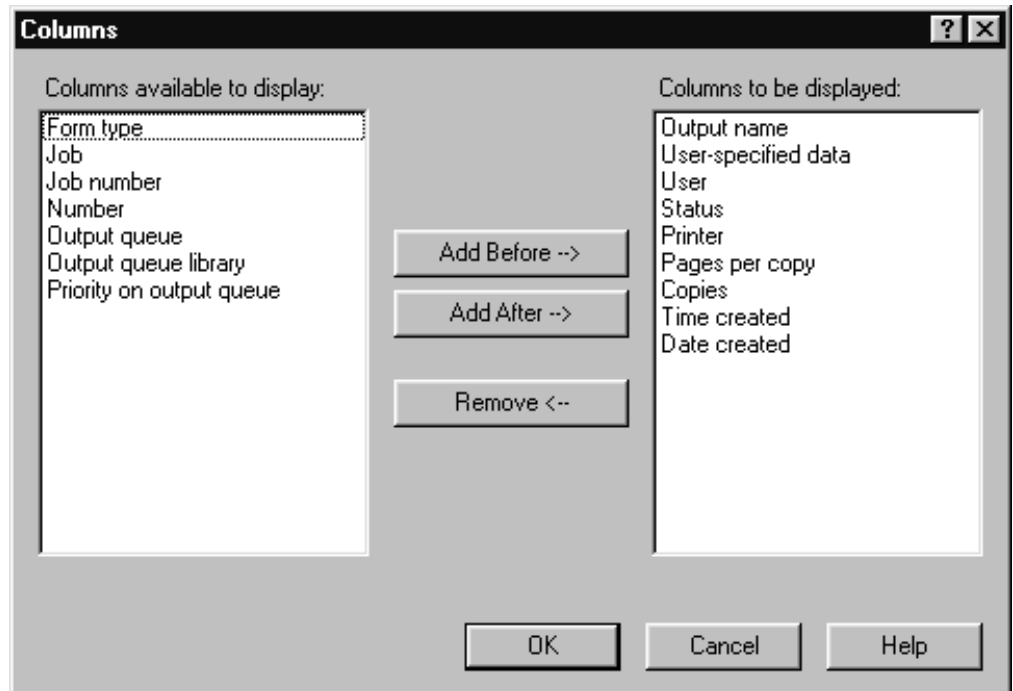


Figure 143. Columns

5. You can also specify which printer output you want to list, by User, Printer, Output Queue, and so on. Select View on the title bar of the Output List window, and then select Include. You can make any changes to the following window:

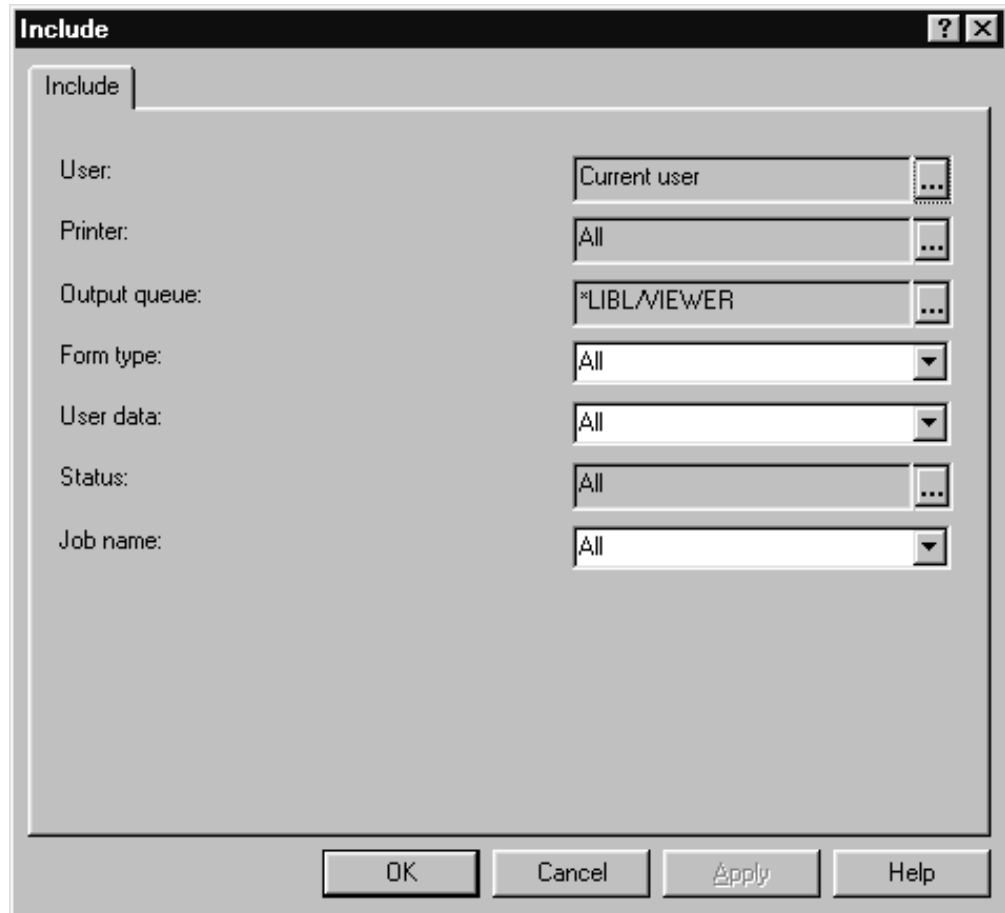


Figure 144. Include Printer Output

6. Once you have the Output List organized to your liking, you can double-click on any spooled file in the list. This automatically invokes the AFP Workbench for OS/2 and Windows Viewer, which allows you to do the following:
 - See your spooled file on the display.

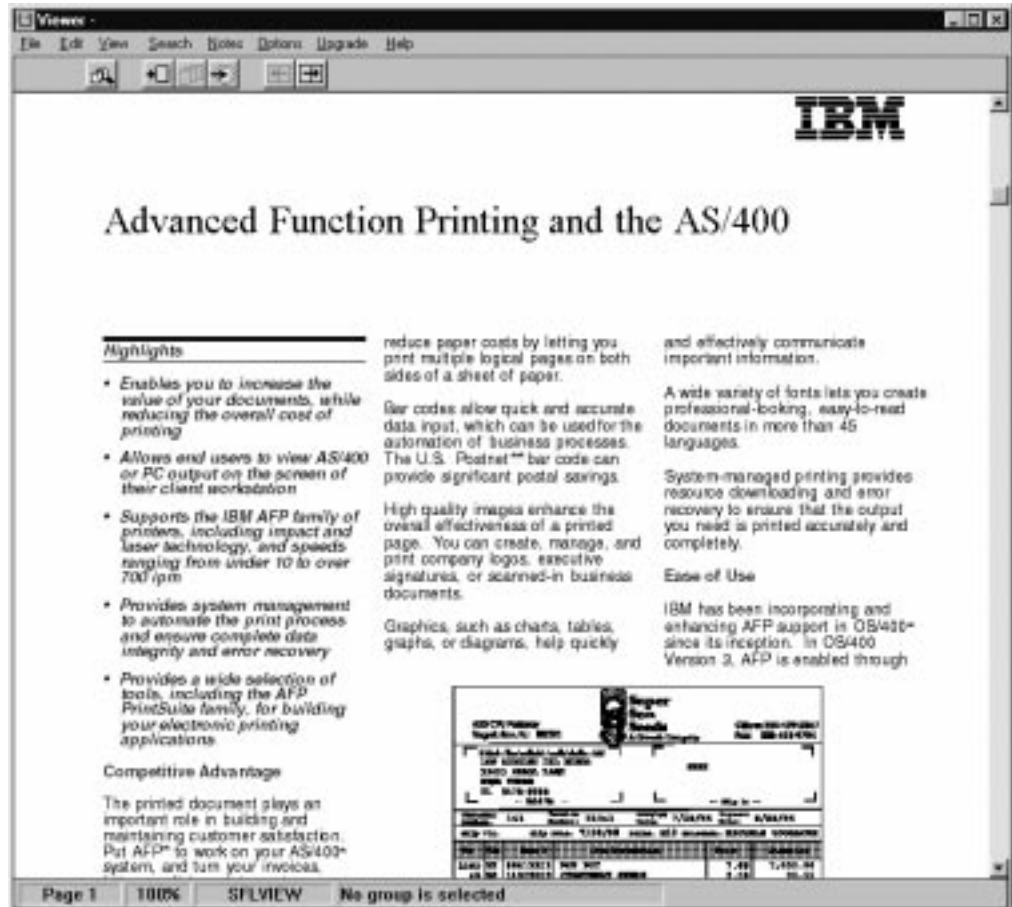


Figure 145. Spooled File Displayed

- Use the AFP Workbench Viewer functions such as zooming, rotating, and so on.
- Print the viewed spooled file to a locally attached printer (if function is available)

Calling the AFP Workbench Viewer Directly from Your Application

The AFP Workbench Viewer can also be called directly from your application program. You can use the Start PC Command (STRPCCMD) to invoke the Viewer program (CWBVIEWR). The program needs to be passed the complete ID of the target spooled file. For an example, see the SEGMENT and OVERLAY commands in “Appendix I. AS/400 SEGMENT and OVERLAY Commands” on page 343.

Chapter 17. Using Facsimile Support, OfficeVision, and OnDemand for AS/400

Electronic AFP documents enable changes in the ways documents have been traditionally handled within an organization. A document can be created, then used in a number of "downstream" business processes. Let's take a look at several IBM AS/400 applications that work with AFP.

Among the AS/400 applications that utilize AFP are:

- Facsimile Support for AS/400 (FAX/400)
- OnDemand for AS/400 (OnDemand)
- OfficeVision/400 (OV/400)

Using Facsimile Support for AS/400

Facsimile Support for AS/400 provides comprehensive facilities to manage fax within your organization. It can handle inbound faxes, receiving, managing, viewing, and printing those documents. It can send any spooled information on your AS/400 outbound, including setting up and managing the transmission. It can also send data from a PC client that is attached to the AS/400 via Client Access/400 and using the AFP device for IBM Facsimile Support for AS/400. This PC client can be a Windows NT, Windows 95, Windows 3.1, or OS/2 client. Facsimile Support for AS/400 emulates the AFP function of the IBM 3816 printer. This enables it to handle any image or coded (AFP) data, whether it is in the compressed image format of an inbound fax or in the AFP format of a spooled file.

Super Sun Seeds Case Study

Facsimile Support for AS/400 works well with the Super Sun Seeds case study by providing the ability to fax a copy of the Super Sun Seeds invoice to a customer. Assuming that the information being faxed, an invoice or set of invoices for a specific customer, resides in an individual spooled file. Faxing is done most easily by providing a reprint program that selects and reprints specific invoices.

The following section shows how the invoice can be faxed.

From the Facsimile Support for AS/400 main menu, select option 5, "Outbound Fax". The Outbound Fax Commands Display appears.

FAXOUT	Outbound Fax Commands	System: BLDSYS1
--------	-----------------------	-----------------

Select one of the following:

1. Work with Fax Output Queue
2. Work with Fax File Attributes
3. Change Fax File Attributes
4. Delete Fax File
5. Send Fax

Enhanced Services:

21. Create Fax Note
22. Check Fax Status
23. Print Fax Status
24. Submit Fax

Selection or command
 ==> 1
 F3=Exit F4=Prompt F9=Retrieve F12=Cancel F13=Information Assistant
 F16=System main menu

Figure 146. Outbound Fax Commands

Select option "1" to work with a fax output queue.

Work with Fax Output Queue (WRKFAXQ)		
--------------------------------------	--	--

Type choices, press Enter.

Output queue	super	Name, *SNDQ, *SAVQ, *ERRQ
Library	qgp1	Name, *LIBL, *CURLIB

Select files for:

User	*CURRENT	Name, *CURRENT, *ALL
User data	*ALL	*ALL, *CURRENT, *TIMED

Bottom

F3=Exit F4=Prompt F5=Refresh F12=Cancel F13=How to use this display
 F24=More keys

Figure 147. Work with Fax Output Queue (WRKFAXQ)

You are prompted for output queue information. Select output queue SUPER in library QGPL.

Work with Fax Output Queue						
----------------------------	--	--	--	--	--	--

Queue: SUPER	Library: QGPL
--------------	---------------

Type options, press Enter.

1=Send fax 3=Hold 4=Delete 5=Display 6=Release

Opt	File	FNbr	Job	User	Number	User Data
1	INVNEW2	1	QPADEV0003	WCSHAFF	104946	INVNEW2
	QSYSPRT	2	QPADEV0003	WCSHAFF	104946	
	QSYSPRT	3	QPADEV0003	WCSHAFF	104946	

Bottom

Parameters or command
 ==>
 F3=Exit F4=Prompt F5=Refresh F9=Retrieve F12=Cancel F17=Top
 F18=Bottom F20=QFAXOPR F22=Printers
 (C) COPYRIGHT IBM CORP. 1991, 1995.

Figure 148. Work with Fax Output Queue

The spooled files in the SUPER output queue are displayed. Select “1” (Send fax) to send the INVNEW2 spooled file as a fax. If you have set up a fax profile that has the environment of 2 = Enhanced, you will see the Submit Fax (SBMFAX) command.

Send Fax (SND FAX)

Type choices, press Enter.

Send to:

Telephone number > 3039246300

To line 1 for cover page . . . > 'Improved Printing Corp'

To line 2 for cover page . . . > 'Performance Boulevard'

To line 3 for cover page . . . > PRINTERSVILLE

+ for more values

Spooled file > INVNEW2 Name

Job name > QPADEV0003 Name, *

User > WCSHAFF Name

Number > 104946 000000-999999

Spooled file number > 1 1-9999, *ONLY, *LAST

Transmission mode *FINE *FINE, *NORMAL

Create cover page > *YES *NO, *YES

More...

F3=Exit F4=Prompt F5=Refresh F12=Cancel F13=How to use this display

F24=More keys

Figure 149. Send Fax Display

Type in the fax information, including “send to” information, phone number, and company name: Improved Printing Corporation. Specify “*YES” in the “Create Cover Page” field to have Facsimile Support for AS/400 generate a cover sheet for the fax.

Send Fax (SND FAX)

Type choices, press Enter.

Cover page printer file QPFFCVP Name, *DFT

Library Name, *CURLIB

Title line for cover page Invoice Confirmation

From lines:

From line 1 for cover page . . . Super Sun Seeds

From line 2 for cover page . . . *BLANK

From line 3 for cover page . . . *BLANK

Comment for cover page Please review


More...

F3=Exit F4=Prompt F5=Refresh F12=Cancel F13=How to use this display

F24=More keys

Figure 150. Send Fax Display (continued)

On this continuation display for Send Fax, specify the printer file name for the cover page and the “To” information. The printer file QPFFCVP is an AFP data stream printer file used to support the fax transmission. The Super Sun Seeds fax cover page overlay is shown below:

400 CPU Parkway Vegetation, NJ 55090	 <div style="display: inline-block; vertical-align: middle;"> Super Sun Seeds <small>A Growth Company</small> </div>	Office: 555-499-2367 Fax: 555-415-9794
<h2 style="margin: 0;">Fax Transmission</h2>		

This invoice overlay designed using IBM AFP Utilities/400

Figure 151. Sample FAX Overlay

Specify the cover page overlay name (SSSFAX) as the front overlay name in the QPFFCVP printer file.

Work with Fax Output Queue

Queue: QFFSNDFA Library: QUSRSYS

Type options, press Enter.

2=Change 3=Hold 4=Delete 5=Display 6=Release 8=Attributes

Opt	File	FNbr	Job	User	Number	User Data
	INVNEW2	1	QPADEV0003	WCSHAFF	104946	*CURRENT

Bottom

Parameters or command
==>

F3=Exit	F4=Prompt	F5=Refresh	F9=Retrieve	F11=View 2	F12=Cancel
F17=Top	F18=Bottom	F20=QFAXOPR	F22=Printers		

Figure 152. Work with Fax Output Queue

Once the requested fax has been sent, it is listed on the outbound fax queue. The outbound fax (INVNEW2) is listed on this queue. When the fax is physically sent, the Super Sun Seeds cover page with the fax information also is sent, followed by the Super Sun Seeds invoice for Improved Printing.

From this display you can also select option “5” to display the spooled file being sent (the invoice).

```

Display Spooled File

File . . . . . : INVNEW2                               Page/Line 1/12
Control . . . . . :                                       Columns 1 - 78
Find . . . . . :
*...+...1...+...2...+...3...+...4...+...5...+...6...+...7...+...
IMPROVED PRINTING CORP
PERFORMANCE BOULEVARD
PRINTERSVILLE
CO 45789-2637

      100              31300              3/09/96              4/09/96
      BEST WAY              3/09/96      NET 30      YOUR PRINTER RE
1 PK  01100517  SPARTAN SEEDS              2.39              2.39
9 PK  04569870  NORTHERN LITE BLUE SPRUCE    858.32              7,724.88
12 BX 11005004  BUSH GREEN SEEDS              2.50              30.00
12 CT 11005011  LASSO RED SEEDS             892.23             10,706.76
26 PK 11005018  EARLY BANTAM SEEDS              .38              9.88
5 BX  11057893  AFRICAN DAISY, SEEDS          2.35              11.75
1 PK  15975365  HEAVY OAK                    129.09             129.09
33 BX 32746510  HOPS BREWING LIGHT              1.20              39.60
6 EA  46578913  SEED SURVEYING SITE            50.00             300.00
2 BX  56413213  POT POT                        7.65             15.30
                                           More...

F3=Exit  F12=Cancel  F19=Left  F20=Right  F24=More keys
Bar codes not displayed.

```

Figure 153. Display Spooled File

You can see a non-graphical display of the invoice. With Client Access/400 viewing support, you can display a complete graphical display of the invoice.

Using OnDemand for AS/400

IBM OnDemand for AS/400 (OnDemand, previously known as R/DARS) is an application solution to store large volumes of data and retrieve selective data, whether on disk, optical, or tape storage media. It provides computer output to laser disk (COLD) and extended archiving functions for the AS/400.

OnDemand:

- Provides a functionally rich, cost effective application solution to store and retrieve large volumes of data
- Provides users with a powerful search and browse capability to locate specific information
- Extracts index values, and compresses and stores data on disk, optical, or tape storage media
- Manages the life cycle requirements of data and automatically moves data to the appropriate media
- Helps reduce cost by eliminating the need to print to paper or microfiche, improving the usability of report information, increasing productivity, and enhancing customer service capabilities
- Offers a powerful administration system, both menu-driven and graphical, for data definition, management, and security

Super Sun Seeds Case Study

OnDemand complements the Super Sun Seeds invoicing application well, providing a comprehensive system to manage documents after they have been issued. The spooled file of multiple invoices can be defined to OnDemand, automatically indexed, compressed, and stored or archived to disk, optical, or tape media. Super Sun Seeds invoicing information can then be easily retrieved, down to the individual invoice.

The invoice can also be reprinted or faxed (using Facsimile Support for AS/400). This saves the Super Sun Seeds Company money by not needing to print multiple copies of invoices for their records, not needing to send the data to microfiche, and not needing to keep large spooled files on their AS/400. It more significantly improves productivity and customer responsiveness by providing the capability for customer service representatives, for example, to view, print, and fax invoices right from their desks while speaking with customers.

The following example shows how the invoice spooled file is defined by OnDemand using the menu-driven administration system. A new graphical report definition tool is also available for point-and-click definition of key values, etc.

Create Report Definition - Environment

OD400
1/08/98 14:09:29

Report	:	INVOICES
Version	:	01
Report type	:	DOC
Input record length	:	133
Collection name	:	INVCOLL
Report overlay	:	
Report data type	:	*AFPDS
Report group	:	
Translate print control	:	N Y=Yes, N=No
Printer file	:	
Library	:	
Text	:	Super Sun Seeds invoices
Posting date type	:	1

More...

Press Enter to continue.
F3=Exit F12=Cancel

Figure 154. Create Report Definition - Environment

Filling in the fields on the display begins the OnDemand definition of the Super Sun Seeds invoices. Identify the name by which users will retrieve the invoices (INVOICES). Enter information regarding the attributes of the report, and desired migration characteristics (when to move the compressed data to optical or tape; for example, defined elsewhere within OnDemand as Collection name INVCOLL). Identify that this is an AFP data stream spooled file, and enter a meaningful description of the spooled file for easy recognition by users. You can also tell OnDemand to take the invoice date that is printed on the invoice itself and use that as the date stamp by which users will later search for this set of invoices.

Create Report Definition - Segmentation		OD400
		1/08/98 14:09:38
Report name	INVOICES	
Version	01	
Segmentation condition 1:		
Change/Match	1	1=Change, 2=Match
Value		
Length	5	
Column	33	
Line	5	
-OR-		
Pivot value		
Length	0	
Column	0	
+/- line offset	0	
Condition combination	0	0=None, 1=And, 2=Or
		Bottom
Press Enter to continue.		
F3=Exit F12=Cancel		

Figure 155. Create Report Definition - Segmentation

The definition display shown above tells OnDemand how to break up the entire spooled file into separate, multipage invoices. OnDemand doesn't care how many pages belong to each invoice - that number can vary - as long as you tell OnDemand how to determine when one invoice ends and the next one begins within the spooled file. OnDemand has to do this "segmenting" so that users can retrieve a specific invoice rather than have to scroll through the entire spooled file to find a particular one.

Specifically, the display tells OnDemand to look for a change in a 5-character field in column 33 on line 5. This field represents invoice number. This tells OnDemand to watch for a change in invoice number. When a change is detected, OnDemand knows that the end of the previous invoice has occurred, and that the start of a new invoice has begun. When a user retrieves an invoice, OnDemand knows what pages belong to what invoice.

Create Report Definition - Keys		OD400
		1/08/98 14:09:47
Report name	INVOICES	
Version	01	
Key 1 name	Invoice #	
Length	5	
Minimum search characters	1	
Location:		
Column	33	
Line	5	
-OR-		
Pivot value		
Length	0	
Column	0	
+/- line offset	0	
Lower case key	N	Y=Yes, N=No
Key security	N	Y=Yes, N=No
Multi-key	N	Y=Yes, N=No
		More...
Press Enter to continue.		
F3=Exit F12=Cancel		

Figure 156. Create Report Definition - Keys

The display above shows the OnDemand definition for the first search field (key), which was chosen to be the invoice number. This tells OnDemand where the invoice number appears on the printed page. Notice that you can use pivot values (character literals that print near the data you are defining) if the key value is not always on the same line within the invoice. A pivot value was not needed to find invoice number in this example.

The same technique can be used to define other keys used for retrieval, such as customer number and customer name. You can also define display fields such as invoice total, which can be valuable information to extract related to each invoice.

The INVOICES are defined to OnDemand one time, and then each time the invoices spooled file is created (weekly or monthly, for example), the spooled file can be automatically captured and stored within OnDemand. There are a number of ways to automate the process so that no operator intervention is required.

Once the invoices are stored, the real value of OnDemand becomes obvious, because it provides the capability to quickly and easily find any invoice ever stored. Once found, an invoice can easily be viewed, printed, or faxed using a variety of end-user interfaces, as illustrated below.

Examples are presented beginning with those that show the least graphical interface, with samples of a 5250 interface on a non-programmable terminal. Examples at the end of this section show the new graphical user interface.

For Non-programmable Workstation Users

The next few screens show what is displayed on a non-programmable workstation.

OD400
1/08/98 14:10:15

Specify Report Search

```

***** **
**      **      ** ***** ***** **
**      **      * **      **      **      **      **      **      **
**      **      * **      **      **      **      **      **      **
**      **      **      **      ** ***** **      **      **      **
**      **      **      **      **      **      **      **      **
**      **      **      **      **      **      **      **      **
**      **      **      **      **      **      **      **      **
***** **      ** ***** ***** **      **      **      **      400
Type choices, press Enter.
Report . . . . . INVOICES      Name, generic*, F4 for list
-OR-
Report Group . . . . .      Name, generic*, F4 for list
Date range:
  From . . . . .      YYYYMMDD
  To . . . . .      YYYYMMDD
F3=Exit  F4=Prompt  F12=Cancel

```

Figure 157. Specify Report Search

As a user searching for an invoice, the first step is to tell OnDemand what you are looking for. In the case study, you are looking for INVOICES, so enter it in the display shown above. You also could have entered a partial report name (such as INV*) or pressed the F4 function key to see a list of all reports to which you are authorized. You can also enter a date range to narrow your search, or simply leave the date range blank to see all invoice runs stored in OnDemand.

Select Report Result						OD400
						1/08/98 14:10:19
Type option, press Enter.						
1=Select						
			Sequence			
Opt	Report	Report date	number	Location	Text	
1	INVOICES	1996-03-07	001	Disk	Super Sun Seeds invoices	
	INVOICES	1996-02-07	001	Disk	Super Sun Seeds invoices	
	INVOICES	1996-01-07	001	Disk	Super Sun Seeds invoices	
	INVOICES	1995-12-07	001	Optical	Super Sun Seeds invoices	
						Bottom
F3=Exit F12=Cancel						

Figure 158. Specify Report Result

Select the most recent run of invoices, and press Enter to continue.

Specify Document Search				OD400
				1/08/98 14:10:25
Report	. . . . . : INVOICES			
Report type	. . . . . : DOC			
Type choices, press Enter.				
Key values:				Required key length
1. Invoice #	. . . . .			1 - 5
2. Customer #	. . . . .			1 - 3
3. Cust Name	. . . . .			1 - 20
Search all report sequence numbers	. . . . . Y			Y=Yes N=No 1-999
Report sequence number	. . . . . 001			
Date range:				
From	. . . . . 19960307			YYYYMMDD
To	. . . . . 19960307			YYYYMMDD
F3=Exit F12=Cancel				

Figure 159. Specify Document Search

On this display, enter the search criteria. You may know the actual invoice number or you may need to review all the invoices for a particular customer number or customer name for the last six months (by expanding the date range near the bottom of the display). You may also enter customer name IMP* to save keystrokes and let OnDemand find any invoices for customers with names beginning with IMP (such as IMPROVED PRINTING COMPANY). In the example, search for all invoices that begin with 313.

Specify Document Search		OD400
		1/08/98 14:10:43
Report	: INVOICES	
Report type	: DOC	
Type choices, press Enter.		
Key values:		Required key length
1. Invoice #	313*	1 - 5
2. Customer #		1 - 3
3. Cust Name		1 - 20
Search all report sequence numbers		Y=Yes N=No
		1-999
Report sequence number	001	
Date range:		
From	19960307	YYYYMMDD
To	19960307	YYYYMMDD
F3=Exit F12=Cancel		

Figure 160. Specify Document Search with Invoice Number

Pressing Enter after typing the search criteria results in the display below:

Work with Documents		OD400
		1/08/98 14:11:02
Report	: INVOICES	Super Sun Seeds invoices
Type choices, press Enter.		
5=Display 6=Print 7=Fax		
Opt	Date	Invoice # Customer # Cust Name Invoice Total
	19960307	31300 100 IMPROVED PRINTING CO \$90,652.21
	19960307	31336 136 ORGANIC GARDEN SUPPL \$147,561.56
	19960307	31341 141 LOS ARBOLES DEL MUND \$99,991.52
	19960307	31354 154 THE LAST LEAF \$6,070.64
		Bottom
F3=Exit F12=Cancel		

Figure 161. Work with Documents

The display above shows a list of all invoices found that meet the search criteria. Notice that this display shows the invoice date, the three key field values (invoice number, customer number, and customer name) and the informational field (invoice total). It is possible that you can answer a significant number of inquiries about invoices simply by coming to this display to tell a customer the total dollar amount on their invoice, and then faxing or reprinting a copy for them.

Work with Documents		OD400
		1/08/98 14:11:02
Report	: INVOICES	Super Sun Seeds invoices
Type choices, press Enter.		
5=Display 6=Print 7=Fax		
Opt	Date	Invoice # Customer # Cust Name Invoice Total
5	19960307	31300 100 IMPROVED PRINTING CO \$90,652.21
	19960307	31336 136 ORGANIC GARDEN SUPPL \$147,561.56
	19960307	31341 141 LOS ARBOLES DEL MUND \$99,991.52
	19960307	31354 154 THE LAST LEAF \$6,070.64
		Bottom
F3=Exit F12=Cancel		

Figure 162. Work with Documents - Selecting Option 5

If you want to view the invoice, enter option “5” to display the invoice. Depending on your particular environment, you may see one of the following two resulting displays.

When you select option “5” to display the invoice and you are working on a non-programmable terminal, then OnDemand will invoke a “best efforts” view of the data portion of the AFP data stream on the terminal. This enables users without a workstation to be able to view the data portion of an AFP data stream invoice at their desk. It appears as shown in Figure 163.

```

Display Spooled File
File . . . . . : QSYSVRT      Page/Line  1/12
Control . . . . .      Columns  1 - 78
Find . . . . .
*...+...1...+...2...+...3...+...4...+...5...+...6...+...7...+...
      IMPROVED PRINTING CORP
      PERFORMANCE BOULEVARD
      PRINTERSVILLE
      CO 45789-2637
          100          31300          3/07/96          4/07/96
      BEST WAY          3/07/96      NET 30      YOUR PRINTER RE
1 PK 01100517 SPARTAN SEEDS          2.39          2.39
9 PK 04569870 NORTHERN LITE BLUE SPRUCE      858.32      7,724.88
12 BX 11005004 BUSH GREEN SEEDS          2.50          30.00
12 CT 11005011 LASSO RED SEEDS      892.23      10,706.76
26 PK 11005018 EARLY BANTAM SEEDS          .38          9.88
5 BX 11057893 AFRICAN DAISY, SEEDS          2.35          11.75
1 PK 15975365 HEAVY OAK          129.09          129.09
33 BX 32746510 HOPS BREWING LIGHT          1.20          39.60
6 EA 46578913 SEED SURVEYING SITE          50.00          300.00
2 BX 56413213 POT POT          7.65          15.30
                                          More...
F3=Exit  F12=Cancel  F19=Left  F20=Right  F24=More keys
Line numbers of file adjusted.

```

Figure 163. Display Spooled File

This invoice, in its fully-resolved form, can be reprinted or faxed, if available, from the non-programmable terminal.

For Programmable Workstation Users with AFP Viewer

The next few screens show what is displayed on a programmable workstation with AFP Viewer installed.

Select option “5” to display the invoice, as described above, and if you are working on a programmable workstation that has the IBM Client Access/400 AFP Viewer software installed, then OnDemand will invoke the viewer to display a fully-resolved AFP data stream invoice (as shown in Figure 164 on page 252).

Viewer - Printer Output - INVNEW2 B - 51019640

File Edit View Search Notes Options Help

99% CPU Satting
Regulation 50% 225%

Super
Sun
Seeds
A Growth Company

Office: 222-422-2357
Fax: 222-415-2224

IMPROVED PRINTING CORP
PERFORMANCE BOULEVARD
PRINTERSVILLE
CO 45789-2637

Sold To

Ship To

Customer Number: 100 Invoice Number: 31300 Invoice Date: 3/13/96 Payment Due Date: 4/13/96

Ship Via: BEST WAY Shipped Date: 3/13/96 Terms: NET 30 Salesman: YOUR PRINTER REP

Qty	Unit	Lot #	Line Description	Price	Amount
1	PK	01100517	SPARTAN SEEDS	2.39	2.39
9	PK	04569870	NORTHERN LITE BLUE SPRUCE	858.32	7,724.88
12	EX	11005004	BUSH GREEN SEEDS	2.50	30.00
12	CT	11005011	LASSO RED SEEDS	892.23	10,706.76
26	PK	11005018	EARLY BANTAM SEEDS	.38	9.88
5	EX	11057893	AFRICAN DAISY, SEEDS	2.35	11.75
1	PK	15975365	HEAVY OAK	129.09	129.09
23	EX	32746510	HOPS BREWING LIGHT	1.20	39.60
6	EA	46578913	SEED SURVEYING SITE	50.00	300.00
2	EX	56413213	POT POT	7.65	15.30
80	PK	65412384	SEED SCRUBBER	888.79	71,103.20
1	PK	84512023	OREGON SPRING TOMATO SEED	.97	.97
2	DE	96325874	PINEAPPLE-ORANGE SEEDS	1.29	2.58
11	EX	98412006	BLACK BEAUTY ZUCCHINI	2.30	25.30
5	EA	98546320	FROZEN JUICE PROCESSOR	109.90	549.50
1	CT	00000300	HIGH ALTITUDE WATERMELON	1.01	1.01

Page 1 90% SELFVIEW No group is selected

Figure 164. CA/400 Viewer Display of Super Sun Seeds Invoice

For Programmable Workstation Users with OnDemand Client

For a completely graphical interface, OnDemand now offers a client/server end-user interface to the archived data. Rather than using a 5250 screen as described previously, end users can invoke the client directly from an icon on the Windows or OS/2 desktop.

After logging into the server via the dialog box that appears when you click on the OnDemand icon, a list appears with folders (reports) to which you are authorized. The following screen is an example.

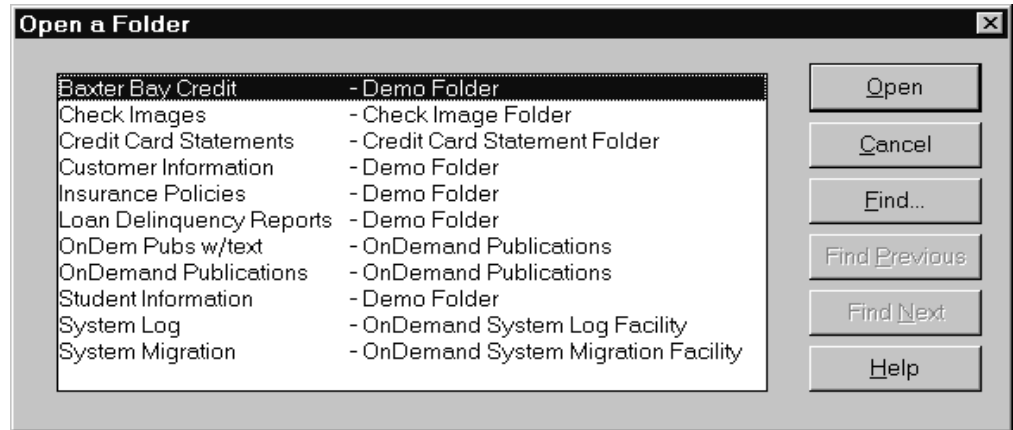


Figure 165. OnDemand Display of a Folder (Report) List

To open a folder, double-click on a folder name or select a folder name and then choose **Open**. The Search Criteria and Document List dialog box is displayed.



Figure 166. OnDemand Search Criteria and Document List Dialog Box

To search for documents, first enter your search criteria by typing text into any of the search entry fields and selecting a search operator. Then choose any of the powerful search operators, such as equal to, not equal to, like, between, greater than, and less than. Simply click on the operator to select it.

When you have entered your search criteria and chosen your search operator, select **Search**. OnDemand fills the documents list with the documents that satisfy your search criteria and updates the status bar with a count of the documents. From this list, you can either choose a single document to view or select multiple documents to view simultaneously.

Figure 167 on page 254 shows an example of a fully-resolved AFP data stream document displayed by the Client Viewer. You can either print or fax (if available) the document from your workstation.

OnDemand - [04/03/95 000-000-007 ANN ARBOR CYCLERY]

BAXTER BAY BANK
More Bank for the Buck

PAGE 1 OF 1

STATEMENT DATE	
04/03/95	
CREDIT LIMIT	
2000.00	
DEBIT BALANCE	CREDIT BALANCE
1825	0
ACCOUNT NUMBER	
000-000-007	

MAKE CHECKS PAYABLE TO: BigbucksCard

DIRECT PAYMENT OR INQUIRIES TO: BigbucksCard Center
CUSTOMER SERVICE
P.O. BOX 100/BOULEVARD, CO 80000
PHONE (123) 123-4567

Ann Arbor Cyclery
1234 Packard St
Ann Arbor, MI 48104

AMOUNT PAID

PLEASE DETACH AND RETURN THIS TOP PORTION WITH PAYMENT

PAYEE	CURRENT BALANCE	RETURN PAYMENT DUE	PAY EITHER AMOUNT	NEW BALANCE	DATE WHEN NEW BALANCE IS DUE	YOUR PAYMENT
32	34.16	34.16		341.62	05/01/95	86.34

Ready Page 1 of 1 100% 1790

Figure 167. OnDemand Display of a Fully Resolved AFP Data Stream Document

Using OfficeVision/400

OfficeVision/400 (OV/400) uses AFP function to significantly enhance the quality of documents it can produce. OV/400 can incorporate images, graphic data files, and electronic overlays into its documents. Combined with OV/400's capabilities to merge application data into documents, this provides some very powerful application possibilities.

For example, company logos, company letterhead, and business forms can all be merged into a document which is, in turn, merged with records from a database file. You can use OV/400 to create sales letters or dunning letters. You can create "form-intensive" applications, such as insurance or mortgage applications, that combine text, overlays, and application data into customer documents.

Super Sun Seeds Case Study

A complement to the Super Sun Seeds invoicing application is a sales or accounts receivable letter application. A marketing letter with OV/400 has been created and is to be sent to the Super Sun Seeds customers. The Overlay Utility of Advanced Function Printing Utilities for AS/400 was used to create a Super Sun Seeds letterhead overlay (BEANLTR), shown in Figure 168 on page 255.



Figure 168. Sample BEANLTR Overlay

Using the front overlay parameter of the printer file for the OfficeVision/400 document, specify the BEANLTR overlay as shown in Figure 169 on page 256.

Revise Document	|Data Field	|	|Adapted	|Pg 1
BEANLTR,PRINT400		|	|Typestyle 155 (PSM)	|Ln 19

<...2...T:...T3...T:...T4...T:...Tv...T:...T6...T:...T7...T:...T8...>:....9..

&NAME@++++
&STREE@++++
&CITY@++++, &STATE@++++ &ZIP@++++

ATTN: &CONTC@

Dear Valued Customer:

Super Sun Seeds has a long tradition of providing some of the finest seed and garden products at competitive prices while also providing our continuing award-winning customer service.

F1=Copy	F7=Window	F14=Get options	F20=Format options
F2=Move	F8=Reset	F15=Columns	F21=Nondisplay keys
F3=Exit/Save	F9=Instructions	F16=Adjust/Paginate	F22=Spell functions
F4=Delete	F11=Insert lines	F17=Functions	F23=Word spell aid
F5=Goto	F12=Cancel	F18=Search/Replace	
F6=Find	F13=Edit options	F19=Print/View	

Figure 169. Super Sun Seeds Letter on OfficeVision/400

The Super Sun Seeds customer letter (BEANLTR) is displayed above. It is being sent to Super Sun Seeds customers, and will be merged with variable data in the customer master file.

	Print Options	Page 1 of 4
--	---------------	-------------

Document : BEANLTR

Type choices, press Enter.

Page range:

Start page	*FIRST	0.01-9999.99, *FIRST, *LAST
End page	*LAST	0.01-9999.99, *FIRST, *LAST

*STRPAGE

Number of copies 1 1-99

Output device 1 1=Printer, 2=Display 3=File

Printer PRT05 *USRPRF, *SYSVAL, *WRKSTN

Printer ID

Output queue *DEV Name, *DEV, *FILE, *WRKSTN

Library *LIBL Name, *LIBL

Output file *DOC Name, *DOC, *FILE

Form type Printer form

Printer file BEANLTR Name

Library PRINT400 Name, *LIBL

More...

F3=Exit	F6=Print queue	F9=Format options	F12=Cancel
F15=Merge data options		F18=Additional page ranges	

Figure 170. OfficeVision/400 Print Options

On the OfficeVision/400 “Print Options” display, specify that the document will use the BEANLTR printer file. In the BEANLTR printer file, the Super Sun Seeds letterhead overlay (BEANLTR) is specified as the front overlay.

OV/400 merges the sales letter document, the BEANLTR overlay, and variable data from the customer master to produce letters like the one shown in the following sample:



400 CPU Parkway
Vegetation, NJ 55090
Office: 555-499-2367
Fax: 555-415-9794

March 16, 1996

Improved Printing Corp
Performance Boulevard
Printersville, CO 45789-2637

ATTN: IBM Printer Prospect

Dear Valued Customer:

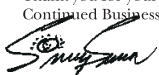
Super Sun Seeds has a long tradition of providing some of the finest seed and garden products at competitive prices while also providing our continuing award-winning customer service.

Recently, you may have seen in the media or may have received advertising pieces in the mail indicating that another seed supplier is "Biggest", "Best", or the ONLY "full service" distributor in the area.

Needless to say, we at Super Sun Seeds have found those statements to be disturbing....to say the least.

Let the record speak for itself. None of those claims amount to a hill of beans.



Thank you for your
Continued Business,

Sonny Sunn
President

This letter was composed using OfficeVision/400. It was printed including an electronic overlay that contained the artwork.

Figure 171. Sample BEANLTR Letter with Overlay and Text

Because it also is possible to include a signature as an image in an OfficeVision/400 document, the signature can be omitted from the overlay and specified in the document. A signature included as an image in a document can be printed dynamically anywhere on the page. See "Using Images with OfficeVision/400" on page 258 for more details.

Additional Examples of Overlays with OfficeVision/400

Printing Front and Back (Odd and Even) Page Overlays

You can print a page overlay on the front sides of a two-sided (duplex), multipage OfficeVision/400 document and print a different page overlay on the back sides of the document. This format is beneficial for publishing applications in which the finished document is bound on the left edge or placed in a notebook.

In the following example, a company procedures manual is a multipage, duplexed OfficeVision/400 document. The front (odd) pages (1, 3, 5, and so on) have the company logo in the upper right corner, but the back (even) pages (2, 4, 6, and so on) have the company logo in the upper left corner.

1. Preparation assumptions:
 - The front and back page overlays are already available on the AS/400
 - A printer file exists specifying the name of the front page overlay and the back page overlay
2. At print time, specify the following in the OfficeVision/400 Print Options:

- The name of the printer file containing the names of the front and back page overlays
- The type of page printing as duplex (two-sided)

The front overlay prints on odd-numbered pages and the back overlay prints on even-numbered pages when you use a duplex-capable, AFP-configured printer.

Printing a Letterhead Overlay Only on Page 1 of a 4-Page Letter

In this example, the following is assumed: Barbara Brown has her own letterhead containing her name, the company name, address, and logo; her letterhead is used for page 1 only of her letters. Subsequent pages use plain paper.

1. Preparation assumptions:
 - The letterhead page overlay is already available on the AS/400
 - A printer file exists specifying the name of the letterhead page overlay as the front page overlay and *NONE as the back page overlay
 - There is only one document for each spooled file
2. At print time, specify the following in the OfficeVision/400 Print Options:
 - The name of the printer file containing the name of the letterhead page overlay.
 - The FORM TYPE is "\$OVLxxx", where "xxx" can be any characters you choose, or blanks. Specifying "FORM TYPE = \$OVL" is the KEY to printing letterhead page overlays. "\$OVL" is the trigger that causes the front page overlay specified in the printer file to be used for page 1 only.

Page 1 of the letter prints with a letterhead. The remaining three pages of the letter use plain paper.

Using Images with OfficeVision/400

OfficeVision/400 supports the use of images within OfficeVision/400 documents. The OfficeVision/400 office editor supports two image file types: IOCA and RFT. Usually, the IOCA file type has a file extension of "IMG" or "ICA". Images used by OfficeVision/400 are stored as images in a folder. OfficeVision/400 cannot use page segments (images objectized for AS/400, then named and stored as AS/400 object type *PAGSEG). Use the following steps to implement images in your OfficeVision/400 documents:

1. Start the OfficeVision/400 editor by entering WRKDOC on the command line or by using menu options.
2. Either create a new document or revise an existing one.
3. Store the image in the document. Do this by pressing "F5=Goto" and then entering "gg", for Get Graphic. On the Get Graphic display, enter the file and folder name information. Make sure the folder that contains the image is the one listed on the folder name prompt. Press "F4" for a list of images in that folder. From this list, select the image you want to include in your document. You may have both IOCA and RFT images in this folder and will see that RFT image types may contain more than one image. Select your choice and press Enter. When you are returned to the Get Graphic display, press Enter again. A message is displayed at the bottom of the edit display reading "Graphic ?????? copied successfully".
4. At this point, the image is saved in the document but we have not specified where to physically place it for printing. To place it for printing, position your

cursor at the location where you want to print the image. After you have positioned the cursor, press "F5=Goto" and then enter "gr" to display the Graphic Instruction display. On the Graphic Instruction display, specify the image name, graphic type, size, margin, and instruction length information. Because it is possible to have more than one image in a document, you must supply the image name. Press "F4" to list the image names in the document. Select the image you want to print in the document. Press Enter. The "Graphic Instruction" display appears again.

On the "Graphic Instruction" display, the Graphic Type will be "2=Image", and "Width & Length" are normally the dimensions of the original graphic. You cannot resize or scale the image. If you enter a dimension smaller than the original graphic, the graphic will be cropped. "Print with text Y or N" is specified if you intend to have text and image on the same printed page. "Indent from paper edge" is the amount of space indented from the left edge of the paper, and "Instruction length" is the length of the graphic instruction you want to display on the edit display.

5. You can view graphics by pressing "F5=View graphic". After you have entered the information required on the Graphic Instruction display, press Enter to place the instruction in the document. Your graphic must be saved as compressed to view it on the display. To view graphics, you must have a workstation with graphic-viewing capability.
6. You can now exit, save and print the document.

Chapter 18. Network Printing

AS/400 printing traditionally meant printing lines of print records on twinax-connected impact printers. Much has changed - electronic printing applications, printer technology, LANs and LAN applications, the extended computing network.

The emergence of LANs in AS/400 customer locations has created two separate print environments: AS/400 host-centric printing of SCS or AFP output and LAN printing of PC-generated output, usually in a PCL or PostScript format. More and more AS/400 customers are looking for ways to integrate these two separate environments. Figure 172 takes a look at AS/400 requirements from an applications perspective.

	AS/400 Legacy Applications	AS/400 AFP Applications	LAN Applications
Output	Lines of text	Sophisticated documents with fonts, images, graphics, bar codes, electronic forms...	Sophisticated documents with fonts, images, graphics, bar codes, electronic forms...
Data Stream	SCS	AFPDS, IPDS	PCL, PostScript
Bi-Directional for error recovery	Yes	Yes	No (though bi-di ascii is emerging)
Print Technology	Mostly impact; some laser	Mostly laser; some impact	Almost all laser;
Printer speed ranges	Up to 2,200 lpm or >729 ppm	Up to 1,200 lpm or >729 ppm	Typically up to 24 ppm, can be up to 40 or 50 ppm

Figure 172. SCS, AFP, and LAN Printing Applications

Traditional AS/400 output is lines of text and/or data in SCS printed a line at a time on mostly impact printers. AFP applications are sophisticated pages of output in first AFP (system) then IPDS (printer) format printed on mostly laser printers. The AS/400 natively supports only AFP and SCS directly. ASCII is supported through transforms of AFP and SCS, or via an individual application (which is transparent to the AS/400).

As the AS/400 is a multi-user, data processing system, the output applications tend to be line-of-business with significant page volumes.

LAN applications also produce sophisticated pages of electronic output, most in either PCL or Postscript format. LAN applications tend to be personal with lower volumes.

Many AS/400 customers have applications in all three categories and want the flexibility to handle the output with AS/400 print management and common printers.

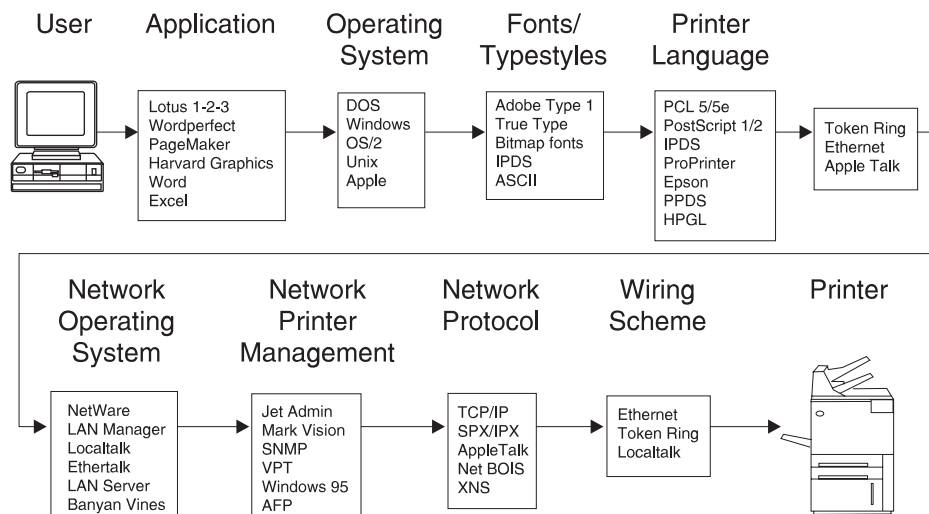


Figure 173. Network Printing Flow

Figure 173 takes a closer look at the network printing flow, revealing the complexity in moving output from application to printer. Applications work under different operating systems and use different resources and printer languages to compose pages. Once composed, print files may be managed by different operating systems and print managers. They may also move across the network, using different communication protocols (TCP/IP, SNA) and different LAN topologies (Token Ring, Ethernet).

In a network-centric environment, TCP/IP is the standard communications protocol. TCP/IP has rapidly become a standard within AS/400 installations. AS/400 network printing enables print files to be moved from AS/400 to network, from network to AS/400, and from AS/400 to other systems. We will look at a number of these network printing scenarios.

In many network print environments, print data must also be transformed. For SCS or AFP print files, the following perform conversion to ASCII formats:

- Host Print Transform
 - SCS to ASCII
 - AFP to PCL
- Advanced Print Services—Warp Server (formerly Print Services Facility for OS/2 or PSF/2)
- Print Services Facility for AIX
- Client Access/400 and Rumba print emulators

For Postscript and PCL print files, transforms are performed by:

- Client Access/400 Virtual Print
- Network Print Server (via APIs)
- Print Services Facility for AIX

Host Print Transform is covered in more detail at the end of this chapter.

AS/400 Output to LAN Printers

Let's look first at moving AS/400 print files to LAN-connected printers. Figure 174 shows AS/400 print and attachment internals and a simplified LAN structure.

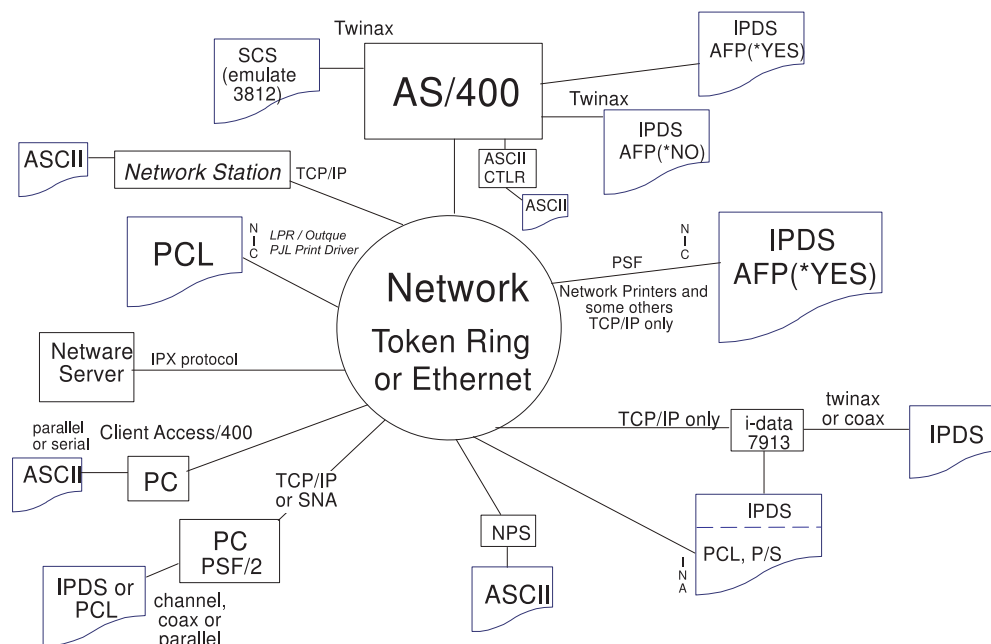


Figure 174. AS/400 to LAN printing

Output files can be sent to:

- LAN-attached IPDS printers directly, with complete print management
- IPDS or PCL printers attached to Warp Server
- Client Access/400-attached ASCII printers
- ASCII printers attached to Non-Programmable Terminals (NPT)
- Printers managed by the Netware integrated server
- Other printers using Network Print Server APIs.

LAN-attached IPDS Printer

Until Version 3 of OS/400, printing to a system-attached twinax printer and printing to a network-attached printer were two very different propositions. With system-attached printers printing SCS and IPDS applications, you had printer file functionality, interactive print process management, and complete error recovery. With network-attached printers, much of this control and function was missing. Standard TCP/IP printing is done through a simple file transfer called Line Printer Requestor (LPR). Most of the AS/400 printer file function and all of the print management control is missing. The spooled file is simply sent to an IP address. An IPDS connection applies an interactive, bi-directional print protocol to this environment. Except for auto-configuration, LAN-attached IPDS printers function the same as system-attached printers. Figure 175 on page 264 illustrates the conceptual flow from AS/400 (using PSF/400) to the LAN-attached IPDS printer.

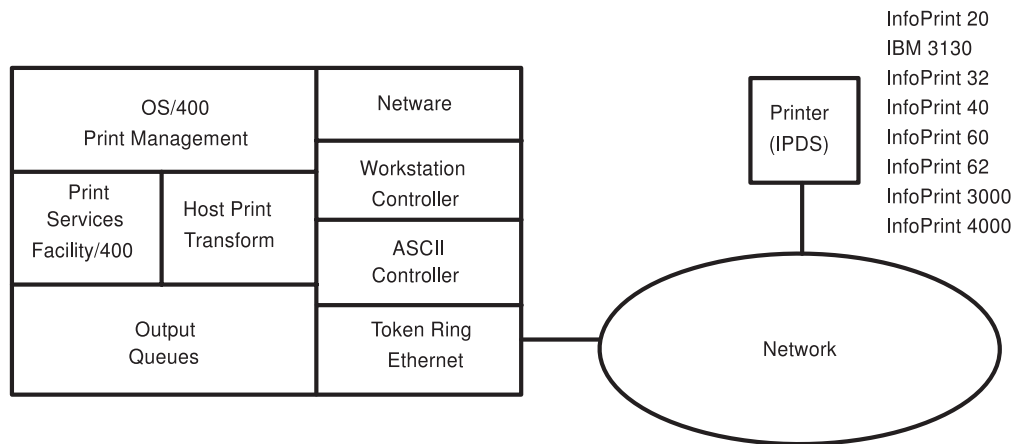


Figure 175. LAN-attached IPDS Printing.

LAN Print Servers

LAN print servers can receive print jobs from AS/400 and manage those files to either IPDS or ASCII printers. IBM LAN print servers include:

- InfoPrint Manager for AIX
- Print Services Facility for AIX (PSF/AIX)
- Advanced Print Services for OS/2 (formerly Print Services Facility/2, or PSF/2)

Printing can be asynchronous or synchronous. With an asynchronous connection, print files are transferred from AS/400 and handled independently by the LAN print server. With a synchronous connection, called Print Services Facility Direct or PSF Direct, printing passes through the LAN print server directly to the target printer. The printers defined to and attached to the LAN print server appear to AS/400 as direct-attached printers.

Distributed Print Function (DPF)

DPF is used to connect an AS/400 to a printer driven by Advanced Print Services. DPF can simultaneously route printed output from several AS/400 systems to different PC-attached printers. In DPF, each printer has a unique device definition on the PC workstation and each connection between an AS/400 and a printer has a unique DPF host receiver. The host receiver is responsible for spooling each AS/400 print file to the PC workstation spool. When the print file and print resources have arrived at the PC workstation, the DPF host receiver sends them to the printer queue. From the DPF printer queue, the print file is sent to the connected LAN print server printer.

The combinations of AS/400s and printers supported is limited by the number of DPF sessions. A session is defined as a connection between a host and a printer, with the printer being equivalent to a host receiver. You can have up to ten AS/400s connected to the same printer, one AS/400 connected to 10 printers, or any combination of hosts and printers that equals ten.

PSF Direct

PSF Direct enables you to print directly to printers attached to IBM's LAN print servers - Advanced Print Services (Warp Server) and PSF for AIX. PSF Direct functions include:

- Support for wide range of IPDS and non-IPDS printers
- Host notification when print files have successfully completed printing, rather than when they were spooled
- Immediate printing while subsequent pages are being transmitted
- Support for additional AFP function such as multiple-up, printer-resident outline fonts, and host-resident outline fonts

Client Access/400-attached ASCII Printer

Emulated printer support (currently SNA) is available to send AS/400 output to printers attached or available to the Client Access/400 client. Data stream conversion from AS/400 SCS (or in some cases, AFP Data Stream) to ASCII is done either by the Client Access/400 print emulator, or by Host Print Transform (HPT).

LAN-attached ASCII Printer (Lexlink Protocol)

ASCII printers can be directly connected to the LAN using one of the following attachments:

- IBM 4033
- MarkNet XLe device
- Lexmark MarkNet or MarkNet XL Integrated Network Option (sometimes referred to as Internal Network Adapter, or INA)

The AS/400 uses a function, called the LAN Print Driver Program, to direct output to printers using these attachments. The IBM 3912/16 and 3112/16 printers are among those supported the OS/400 LAN Print Driver.

LAN-attached ASCII Printers (TCP/IP)

AS/400 can route print to LAN ASCII printers using TCP/IP. This includes the IBM Network Printer 12, 17, and 24 and the IBM 3130 as well as non-IBM ASCII printers with appropriate network attachments. There are two methods to direct print to these printers: (1) Send TCP/IP Spooled File, and (2) the PJI Driver.

Send TCP/IP Spooled File

Send TCP/IP Spooled File is the AS/400 implementation of the standard TCP/IP print file transfer, called LPR or Line Printer Requestor. The AS/400 spooled file is sent to an IP (Internet Protocol) address. The printer must be capable of receiving an LPR transmission—this capability is called LPD, or Line Printer Daemon. With Send TCP/IP Spooled File, the print file is simply sent. There is no print management by AS/400. The transmission has the following characteristics:

- Entire file is sent.
- Some printers ignore the control file that is sent along, losing job control.
- This is a one-way transmission—no control, status, error recovery.
- Entire spooled file is resent on transmission errors.
- Most printer file parameters on AS/400 are inoperable.

- Cancel printing will yield unpredictable results.

PJL File

The PJL Driver (available with V3R7 and later releases) increases the network printing function beyond what is provided by Send TCP/IP Spooled File. With the PJL Driver, a printer device description is created (unlike the case with Send TCP/IP Spooled File). This facilitates a dialog between AS/400 and printer, although this dialog is limited in comparison with IPDS. The PJL Driver supports the copies and page range parameters of the printer file. Some status information is returned from the printer.

Integrated Netware Print Support

The Integrated Netware PC Server provides a closely-coupled Netware server under the covers of AS/400. AS/400 can send print files (after they are converted to ASCII by Host Print Transform) to any Netware-connected printer.

Automatic Session Recovery

Because customers have requested that PSF/400 have the ability to automatically attempt to re-establish an APPC or TCP/IP session with a printer or print server (PSF for OS/2 and PSF for AIX) when that session has been "lost," PSF/400 V4R2 now supports automatic session recovery. Lost sessions can occur because of network or printer problems that happen after a successful session has been started. Now you can correct the printer or network problem without having to monitor the status of the printer writer.

The parameter AUTOSSNRCY of the CRT/CHG/PSFCFG commands lets you select *YES to automatically attempt to reconnect to a printer or print server when the connection has been lost after a connection was successfully started. You can control the number of pages that may be reprinted in the case of an automatic session recovery by changing the ACKFRQ (acknowledgment frequency) parameter. The default is 50, meaning that an IPDS acknowledgment request is sent to the printer after each 50 pages. Setting a lower number for ACKFRQ increases the frequency at which acknowledgments are sent, thus reducing the number of pages that may be reprinted after automatic session recovery. However, performance may be degraded by setting ACKFRQ to a small value.

The configuration object parameter RETRY is now applicable to both APPC-attached and TCP/IP-attached printers. RETRY determines the total number of attempts to restart a session with a printer. For printers attached with TCP/IP, the wait time between retries is always approximately three minutes. For APPC-attached printers, the wait time between retries can be controlled by the RETRYDLY parameter in the configuration object.

PC Output to AS/400 Printers

Client Access/400 Virtual Print

Virtual Print enables a user to print from PC applications, such as WordPerfect or Lotus 123, to AS/400-defined printers. For example, LPT2 can be mapped to PRT02.

Figure 176 shows one example of a basic network structure for moving client print applications to the AS/400.

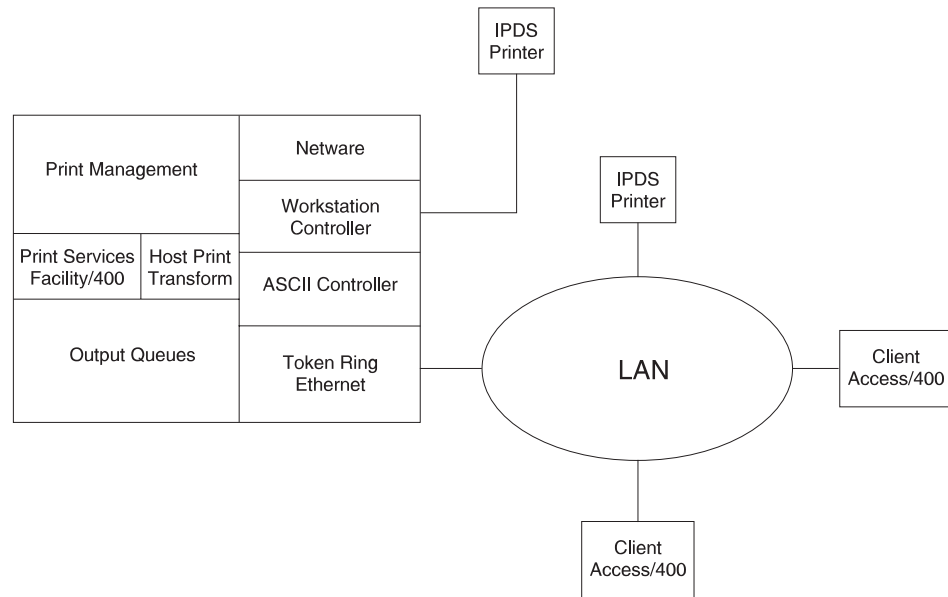


Figure 176. Printing Client applications on AS/400 printers

For full-page client applications (using Postscript or PCL), the print data stream must be converted into IPDS. Figure 177 shows how ASCII print from a Windows application flows to an AS/400-connected IPDS printer. The IBM AFP Printer Driver for Windows is used to generate AFP from the PC application, rather than an ASCII data stream like PCL or PostScript. This process is transparent to the user. The PC print job is automatically intercepted by Virtual Print and re-directed to an AS/400 Output Queue associated with an IPDS printer.

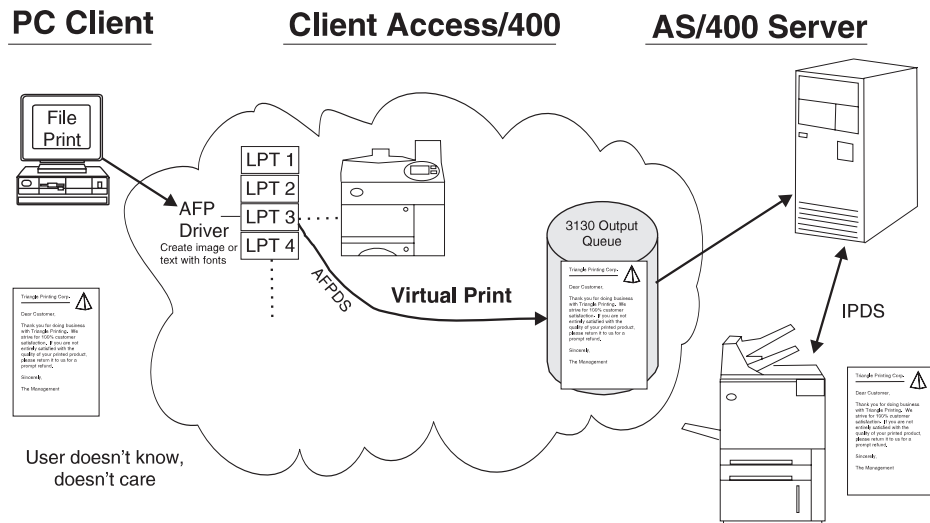


Figure 177. Printing PC applications on AS/400 IPDS printers

Network Print Server

The Network Print Server is the AS/400 component that handles virtual printing. The network print functions used with virtual printing are also available via APIs (Application Program Interfaces). These APIs enable client/server applications to invoke network print function.

LAN Output to LAN Printers

Providing SCS, AFP, and ASCII print support in a single printer does not necessarily require using print transform services. Some printers now provide all of these capabilities. These are workgroup or departmental printers, and they feature multiple attachments to multiple print servers (including the AS/400) while handling multiple print data streams.

The IBM 3130 and the IBM Network Printers are examples of workgroup printers with these capabilities. They can be simultaneously connected to multiple systems (up to three). For example, they can be twinax connected to the AS/400 and Ethernet connected to the LAN. The printers will dynamically switch between print jobs sent by the connected systems. With a feature called automatic sensing, these printers determine which print data stream has been received and the print data stream is correctly resolved. Figure 178 shows a typical multi-connection environment for a workgroup printer.

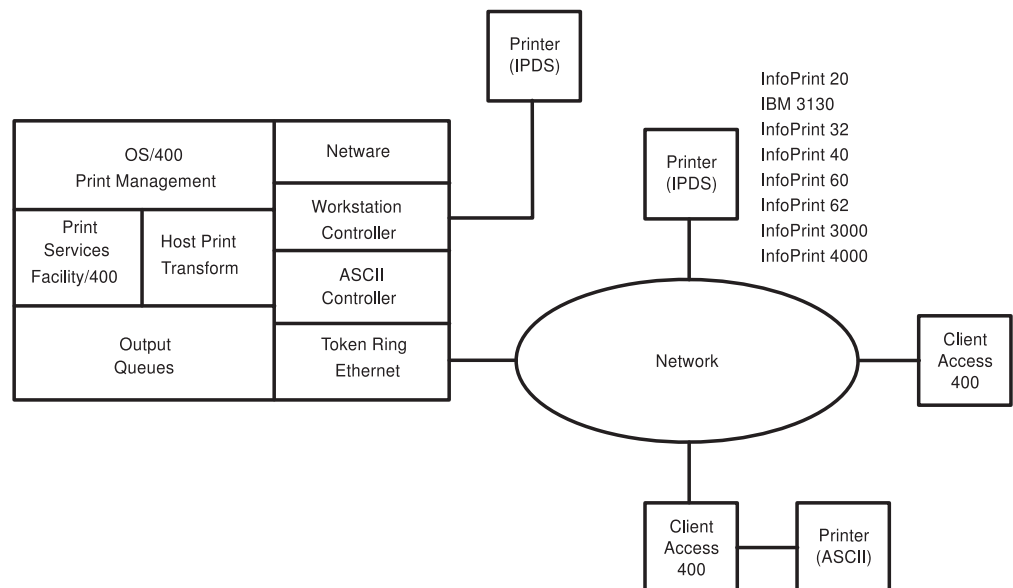


Figure 178. Printing LAN applications on workgroup printers

AS/400 Output to Other Systems' Printers

Network printing can also mean moving AS/400 print files to other AS/400s, to other AFP systems, and to other systems in general. Remote output queue and printer pass-thru enable one AS/400 to treat queues and printers on another AS/400 as if they were local resources. Once the connection is established, you have complete AS/400 print functionality.

AFP print files can be sent to other AFP systems. All required AFP resources (i.e., fonts, overlays, page segments) must be on the target system in order to print.

Finally, any print file can be sent to another system and printed using LPR/LPD support. This is a TCP/IP facility for sending and receiving print files. Some considerations on LPR/LPD printing:

- Target system must be accessed by TCP/IP
- Once sent, there is feedback on when the print file has been spooled, but no feedback on whether or not the file has been printed.
- Certain job characteristics contained in the AS/400 printer file are not sent and SNDNETSPLF will lose certain job characteristics when a file is sent to another system.

Host Print Transform

Host Print Transform is a print writer subsystem that converts native AS/400 print formats (SCS, AFP, and IPDS) into ASCII format. The basic transforms are:

- SCS to ASCII
- AFP to HP-PCL or Lexmark PPDS

With Version 4 Release 2, the transform facility has been extended to include the following:

- Postscript, GIF, and BMP formats as input
- AFP and HP-PCL formats as output

These additional print and image transforms can be handled automatically through the spooling system, or invoked separately through AS/400 commands.

Note: IPDS is not supported as input to HPT.

Host Print Transform services are automatically invoked when the target printer device is an ASCII printer. That determination is made by the Host Print Transform parameter in either the printer device description or the output queue description (in the case of remote output queue).

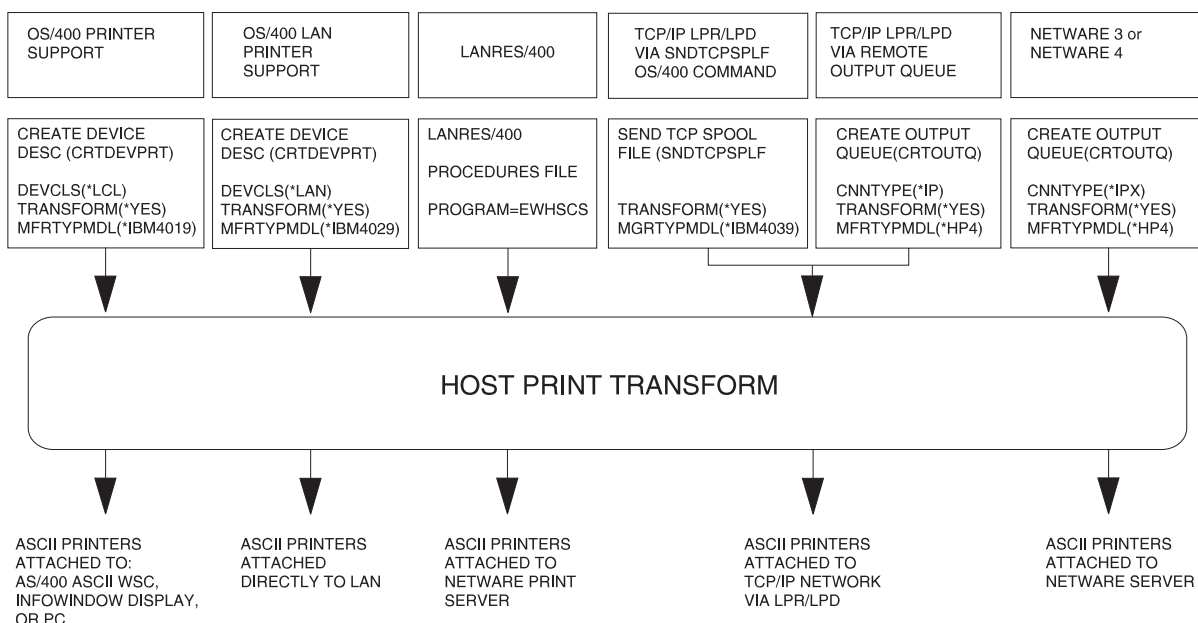


Figure 179. Host Print Transform

HPT is based on a set of tables, called Workstation Customization Objects (WSC Objects) that contain objects defining how SCS and AFP print data are to be translated into ASCII (for example, PCL or PPDS) to support a specific printer. These tables, in essence, are printer drivers for these printers. They cross-reference SCS and AFP printer controls to the ASCII equivalents for a given printer. The tables also filter out commands that a specific printer cannot handle.

You do not have to specify the WSC Object directly. The *Manufacturer Type and Model* parameter of the printer device description provides an extensive list of ASCII printers. Selecting a printer from this list will in turn point to the appropriate WSC Object. It is possible to modify the WSC Object if necessary (for example, to map the DRAWER parameter on the AS/400 to a specific input drawer on the printer). Understanding that the Workstation Customization Object is the driver behind Host Print Transform becomes important if you need to change any aspect of the way the Workstation Customization Object works. Workstation Customization Objects are provided in both source and object form. You can use Source Entry Utility (SEU) to modify the table information within a Workstation Customization Object.

Modifying the printer input drawer is an example of a change you might want to make. For this example, assume that your print job is printing envelopes and using the manual input feeder for those envelopes. The DRAWER parameter in the AS/400 printer file is set to *ENV. This parameter is translated by the Workstation Customization Object for the specific ASCII printer as the manual input drawer on the printer. If you upgrade your printer by adding an automatic envelope feeder, the table in the Workstation Customization Object has to be modified so that it now translates the *ENV parameter to the new automatic envelope feeder. The target command has to be changed to the ASCII control codes that select the automatic envelope feeder. For SCS print files, HPT assumes that the target printer can emulate an IBM 3812 SCS printer. Again, HPT filters out any print function the target printer cannot perform.

The AFP to ASCII print transform is automatically invoked when the input print job is AFP Data Stream. HPT converts the AFP data stream into HP PCL or Lexmark PPDS print data streams. This transform works in one of two ways: raster or mapping. Raster mode builds an image of the page in AS/400 memory to send to the printer. This method provides support for non-page printers such as ink jets. This method provides the best fidelity, but the worst performance. In Mapping mode, AFP data stream commands are mapped into similar commands in the PCL or PPDS data stream. This method is generally faster than Raster mode, but limits function to that supported by the ASCII printer, so fidelity may be an issue. Fonts, as always, can cause trouble when using HPT. In raster mode, host resident fonts are always used to get the character images. Printer resident fonts used in the AFP document are mapped to host resident fonts. In mapping mode, HPT can convert AS/400 host resident fonts to PCL and PPDS fonts and download them to the ASCII printer. This provides good fidelity and consistency, but impacts performance. Requests for printer resident fonts are passed to the ASCII printer and the "best fit" logic of the ASCII printer determines the actual font that is used. This may result in unpredictable and inconsistent output.

The AFP to ASCII Host Print Transform has the following limitations or considerations:

- No Multi-up
- No GOCA (includes large characters created using CHRSIZE)
- No OV/400 or other SCS documents with overlays
- No IPDS error recovery

- Font fidelity
- Performance

Using the AFP transform services of Host Print Transform can complement your AFP applications. HPT facilitates the use of ASCII printers when IPDS printers are not available or not required. An example might be the Super Sun Seeds invoicing application. The normal invoicing run can be printed using an IPDS printer. When a specific invoice needs to be reprinted, either locally or in a remote office, then the AFP to PCL transform can be used with an ASCII printer. In such a case, you trade the advantages of AFP for cost and convenience.

Chapter 19. Cross-System Printing

In many work environments today, printing across networked computer systems is a daily requirement. As an architected, structured print system, AFP can help you print to and from IBM and non-IBM systems. The same printing subsystem runs in all IBM operating systems, and data stream transforms are available in some of these to transform common data streams from other systems. AS/400 further helps printing on remote systems through the Start Remote Writer (STRMTWTR) command, which enables spooled output files to be sent automatically to other systems using SNA Distribution Services (SNADS) or Transmission Control Protocol/Internet Protocol (TCP/IP).

Cross-System Printing Overview

Cross-system printing involves transmitting print requests from one system to another.

On AS/400, the creation of print files is similar to that on other platforms, but the implementation is different. AS/400 uses a printer file to define the attributes of the printed output, and the spooled file, with attributes, is passed to the target system.

Other systems cannot process the AS/400 printer file but may map some or all attributes specified in the printer file to corresponding attributes in the AS/400 system. The architected AFP resource objects (form definition, overlays, fonts, and images) can be processed in all operating systems. Page definitions can be processed in all AFP environments except OS/2 with PSF/2, which requires additional business partner software.

PSF/400 is included as a chargeable feature on AS/400 as part of the OS/400 operating system. PSF/400 is similar to PSF in other operating systems, although the interfaces to it are different in each system.

Supported Data Streams and Formats

AS/400 applications can produce spooled files in the following data streams:

- SCS (SNA Character String)
- IPDS (Intelligent Printer Data Stream)
- AFP Data Stream (Advanced Function Printing Data Stream)
- LINE (Line-mode data stream, or IBM 1403 printer data stream on S/370)
- AFPDSL (Line-mode data stream mixed with AFP data stream)
- USERASCII (ASCII data stream, including PostScript)

An ASCII data stream, including PostScript, can also be placed in a spooled file, in which case the device type is USERASCII. Such a spooled file could be created by a PC or Network Station application and spooled to AS/400 by the virtual print function of PC Support/400. You also can create or purchase AS/400 applications that build their own data stream in ASCII.

The type of data stream produced is determined by the DEVTYPE parameter of the printer file associated with the application.

If you intend to send print files to another system, you should limit your use of DEVTYPE to data streams that can be printed on the target system or that can be transformed by network software programs.

Managing Resources Across Systems

Managing resources across systems involves device and system interchangeability (inline as opposed to externally referenced resources), transferring resources across systems, and automatic resource management with Print Services Facility for OS/2 and PSF/AIX.

Device and System Interchangeability

An AFP data stream spooled file created using Advanced Function Printing Utilities for AS/400 or sent from S/370 may contain references to AFP resources (overlays, page segments, fonts, and so on). Spooled AFP data stream files refer to these AFP resources as either inline resources or external resources. Inline and external resources are described as follows:

Inline resource

The AFP resource object is physically contained in the spooled AFP data stream file. Control characters are placed around individual resources in the spooled file to indicate where the resources begin and end.

If an AFP data stream file contains the AFP resources inline, they do not need to be sent to the target system separately.

Note: You can only create an AFP data stream spooled file that includes inline resources if you use the AFP Toolbox or PrintManager/400.

External resource

The AFP resource is a separate object from the AFP data stream file. The spooled file has a reference to a resource name at the position where the resource is to be printed. When an AFP data stream file that refers to external AFP resources is sent to the target system, the external resources must be sent to the target system as a separate step.

If the AFP resources are not resident on the target system or not inline in the spooled AFP data stream file, the spooled file will not print correctly.

Transferring Resources Across Systems

With cross-system AFP printing, you will need to transfer AFP print resources between systems. The following sections describe transferring resources between these systems:

- One AS/400 System to Another AS/400 System
- MVS to AS/400
- AS/400 to MVS
- VM to AS/400
- AS/400 to VM

Transferring Resources using TCP/IP: The following TCP/IP commands can be used to transfer resources between systems instead of the SNA commands. When using TCP/IP, you transfer the file by FTPing it. Complete the following instructions to FTP the file. The basic FTP commands are printed in bold.

1. **ftp xxxxx** (xxxxx = system name or IP address that you are accessing)
2. Enter Login User ID.
3. Enter Password.
4. **bin** (to set binary image mode)

5. **put XXXXX.xxxx** (XXXXX.xxxx is the name of the resource to be sent to the remote system.)
6. **quit** (to end FTP session)

Other useful FTP commands:

- **lpwd** = local directory
- **pwd** = remote directory (Library on AS/400)
- **get** = get file from remote system and place on local system
- **ls** or **dir** = list files
- **mget** or **mput** = get or put multiple file (Example: mput afp*)
- **help** = list of commands available on this server

Transferring Resources from AS/400 to AS/400: In certain instances, if you have Advanced Function Printing Utilities for AS/400 installed on only one system for example, you may want to transfer AFP print resources from one AS/400 system to another AS/400 system.

If both systems have a common media (tapes or diskettes), the resources can be placed in a library and saved to the media using the SAVLIB command, or the resources can be saved individually using the SAVOBJ command. On the receiving system, the libraries and objects are restored using the RSTLIB and RSTOBJ commands.

You also can transfer resources using a communications line by putting the resources in a save file and then sending the save file to the target system. This procedure is described below:

1. Create the save file by issuing the following command:
`crtsave savf(transfer) lib(afplib) text`
2. Save the AFP resources to the save file by entering savobj and then pressing the F4 key. The Save Object Command panel is displayed. Enter the values you want in the fields of the Save Object Command panel and press Enter.
3. Send the file to the target system by issuing one of the following commands:

With SNA:

`sndnetf file(afplib/transfer) tousrid(elwood rchasm01)`

With TCP/IP (FTP):

`put XXXXX.xxxx`

(file name of resource to be sent to remote system)

Note: When sending savefiles to another AS/400, a blank savefile must exist on the receiving AS/400 and the (replace parm specified on the put command. The command = **put savefile.savf (replace**

4. Before receiving the file on the target system, check to see if the target system has a file to receive the data. If one does not exist, create it by issuing the following command:

`crtsave file(afplib/transfer)`

5. *With SNA only:* Receive the file on the target system by issuing the following command:

`rcvnetf fromfile(transfer) tofile(afplib/transfer)`

Note: Skip this step if you if you used FTP to send the file.

6. Restore the object from the save file by entering `rstobj` and pressing the F4 key. The Restore Object Command panel is displayed. Enter the values you want in the fields of the Restore Object Command panel and press Enter.

Notes:

- a. If you restore the AFP resources into a new library, add the library name to the library list of the receiver of the spooled files.
- b. If you want to use tape or diskettes to transfer you AFP resources, just replace *SAVF in the Device filed of the Restore Object Command panel with the device name; for example, TAP01 or DKT01.

Transferring Resources from MVS to AS/400: AFP print resources can be transferred from MVS to AS/400 either by tape or, if a telecommunication connection is available between MVS and AS/400, by using the MVS transmit command (XMIT) to send the resources and the AS/400 RCVNETF command to receive them.

The MVS command to send the resources might look like the following:

```
xmit node.userid da(level1.level2(member)) seq
```

Note: The SEQ parameter is required so that the resources being sent can be in a form that the AS/400 can accept when the corresponding RCVNETF command is issued to receive the resources.

Transferring Resources from AS/400 to MVS: AFP print resources on the AS/400 are objects, such as overlays (of the type *OVL) and page segments (*PAGSEG). These resources can only be transferred to MVS after they have been converted, using a program like Advanced Function Printing Utilities for AS/400, to physical file members. The physical file member then can be sent to MVS and received as an AFP resource without further conversion.

Transferring Resources from VM to AS/400: AFP print resources can be transferred from VM to AS/400 either by placing the resources inline with the print file or by making them available in an AS/400 library before the print request is submitted.

The resources file is either moved to a tape file using the MOVEFILE command in VM and then moved manually to the AS/400 system, or it is sent by way of a communications link to the AS/400. On the AS/400 system, the file then is either copied from tape onto disk using the CPYFRMTAP command, or it is received with the RCVNETF command as a physical file member.

Transferring Resources from AS/400 to VM: AFP print resources on the AS/400 are objects, such as overlays (of the type *OVL) and page segments (*PAGSEG). These resources can only be transferred to VM after they have been converted, using a program like Advanced Function Printing Utilities for AS/400, to physical file members. The physical file member then can be sent to VM and received as an AFP resource without further conversion.

Note: When putting an AS/400 savefile (savf) to VM, enter FTP command **site fixrecfm 528** to specify fixed record format with 528 byte records before entering the **put** command.

Printing Between AS/400 and System/390

When printing jobs between AS/400 and System/390 (S/390), you need to take into account print job attributes, data stream considerations, resource management, and print job management.

When working with print job attributes, S/390 parameters and AS/400 printer file parameters, you need to know how they match across systems. The MVS S/390 FCB parameter, for example, which specifies the printer file used, is the FILE parameter on AS/400. See Table 5 and Table 6 on page 278 for a more complete listing of these matching parameters.

The S/390 parameters shown in Table 5 and Table 6 on page 278 are supported when data is sent directly to the output queue of a user on the AS/400 system.

If an S/390 printer parameter that is not in the following tables is specified and there is no matching or equivalent AS/400 printer file parameter, the S/390 printer parameter is ignored when the data is printed on the AS/400 system.

The following System/390 parameters are supported when data is sent directly to the output queue of a user on the AS/400 system.

If a System/390 printer parameter that is not in this table is specified, and there is no matching or equivalent AS/400 printer file parameter, the System/390 printer parameter is ignored when the data is printed on the AS/400 system.

Table 5. VM System/390 Parameters

System/390 Printer Parameter Names	VM Commands	Function	AS/400 Printer File Parameter Names
BIN	PSF	Specifies which drawer or bin the paper is taken from.	DRAWER
CC	PRINT, PSF	Specifies control characters.	CTLCHAR ¹
CHARS	SPOOL	Specifies a table of coded fonts.	AFPCHARS
COPY	SPOOL	Specifies the number of copies.	COPIES
DATAACK	PSF	Specifies whether or not the printer will block print positioning and invalid character errors. Twinaxial attached printers will always block print positioning and invalid character errors unless the printer file used to create the spooled file has the fidelity parameter value set to *ABSOLUTE.	No equivalent AS/400 parameter
DEST	TAG	Specifies node and user ID.	No equivalent AS/400 parameter
DUPLEX	PSF	Specifies if duplex printing is to be used.	DUPLEX
FCB	SPOOL, TAG	Specifies the printer file used.	FILE
FORM	SPOOL	Specifies the form type to be used.	FORMTYPE
FORMDEF	PSF	Specifies the form definition to be used.	FORMDF
PAGEDEF	PSF	Specifies the page definition to be used.	PAGDFN
PRMODE	PSF	Specifies the device type, ideographic character data, processing shift-out/shift-in characters.	DEVTYPE, IGCDTA, IGCSOSI
TRC	PRINT, PSF	Specifies if the data stream contains table reference codes.	TBLREFCHR

Table 6. MVS System/390 Parameters

System/390 Printer Parameter Names	MVS JCL Statements	Function	AS/400 Printer File Parameter Names
CHARS	DD, OUTPUT	Specifies a table of coded fonts.	AFPCHARS
CONTROL	OUTPUT	Specifies line spacing.	No equivalent AS/400 parameter
COPIES	DD, OUTPUT	Specifies the number of copies.	COPIES
DATAACK	OUTPUT	Specifies whether or not the printer will block print positioning and invalid character errors. Twinaxial attached printers will always block print positioning and invalid character errors unless the printer file used to create the spooled file has the fidelity parameter value set to *ABSOLUTE.	No equivalent AS/400 parameter
DCB=RECFM	DD	Specifies control characters.	CTLCHAR ²
DEST	DD, OUTPUT	Specifies node and user ID.	No equivalent AS/400 parameter
FCB	DD, OUTPUT	Specifies the printer file used.	FILE
FORMDEF	OUTPUT	Specifies the form definition to be used.	FORMDF
FORMS	OUTPUT	Specifies the form type to be used.	FORMTYPE
PAGEDEF	OUTPUT	Specifies the page definition to be used.	PAGDFN
PRMODE	OUTPUT	Specifies the device type, ideographic character data, processing shift-out/shift-in characters.	DEVTYPE, IGCDTA, IGCSOSI
TRC	OUTPUT	Specifies if the data stream contains table reference codes.	TBLREFCHR

You should be aware of the following considerations when working with S/390 MVS parameters:

FCB If you specify the FCB parameter on MVS, the printer file of that name in the library list of the user receiving the spooled file on the AS/400 system is used. If the FCB parameter is not specified, the AS/400 system printer file QSYSPRT is used.

BIN and DUPLEX

If neither the BIN nor DUPLEX parameter values nor the form definition is specified from MVS, the values for the AS/400 system DRAWER and DUPLEX parameters are taken from the printer file specified in the FCB parameter. If the FCB parameter is not specified, the DRAWER and DUPLEX values are set to *FORMDEF, which means that the values are taken from the form definition.

FORMDEF

If the form definition (FORMDEF) parameter is not specified from MVS, the AS/400 system form definition parameter value is set to *DEVD, and *LIBL is used for the library. *DEVD means the form definition used is the one specified in the device description for the printer you want to use.

AS/400 produces SCS, IPDS, AFP, USERASCII, and AFPDSLNE data streams. If you are using NJE, the SCS data stream will be transformed into EBCDIC line data when sent from AS/400 to the S/390. If you generate an AFP data stream print job on the AS/400, you must use the STRRMTWTR command to send it to the S/390.

1. In order to correctly print System/390 line data with first-character forms control, each channel value specified in the CTLCHAR parameter must have a unique line number associated with that channel value.
2. In order to correctly print System/390 line data with first-character forms control, each channel value specified in the CTLCHAR parameter must have a unique line number associated with that channel value.

The AFPDSLIN data stream (line-mode data stream mixed with AFP data stream) also is supported when printing between AS/400 and S/390. The IPDS and USERASCII data streams are not currently supported when printing between AS/400 and S/390. See “Supported Data Streams and Formats” on page 273 for more information on supported data streams.

The management of resources when printing between AS/400 and S/390 is the same as that between AS/400 and any other system; see “Managing Resources Across Systems” on page 274 for more information.

After data has reached the S/390 spool, all job management is done by the S/390 system. No print job completion messages and no accounting information are sent to the AS/400.

Using the VM/MVS Bridge and NJE

The VM/MVS bridge provides the following functions:

- Distribution services between an AS/400 SNADS and an S/390 Virtual Machine/Remote Spooling Communication Subsystem (VM/RSCS) using either BSC or SNA. The bridge must be SNA if the Network Job Entry (NJE) protocol is used.
- Distribution services between an AS/400 SNADS and Multiple Virtual Storage/Job Entry Subsystem (MVS/JES), either JES2 or JES3, using SNA.
- Sending or receiving of files, messages, input streams, and spooled files between S/390 and object distribution users.
- Distribution of documents created by a document interchange session.
- Distribution of PC files, RFT/FFT documents, notes, and messages between users on OfficeVision/400, DISOSS, or any DIA/SNADS node connected to the bridge.

Using Network Services and the Remote Writer

A remote writer is an OS/400 program that takes spooled output files from a remote output queue and sends them to the specified remote system. The remote writer, which is a system job, sends the spooled output files using SNADS or TCP/IP. This process is called remote system printing on AS/400 and the Start Remote Writer (STRRMTWTR) command is used to begin remote system printing.

Printing Between AS/400 and AIX

AS/400 users can print their AS/400 files on printers attached to the RISC System/6000 (RISC/6000) and RISC/6000 users can print their files on printers attached to AS/400. You can send print files between the two systems in all of the major data streams: ASCII, PostScript, AFP, IPDS, and so on. The connection between the two systems can be either SNA or TCP/IP.

Refer to *IBM AS/400 Printing IV* for more information.

Using an AFP Printer to Print PostScript Output

If you use an IBM Network Station or PC to run applications that generate a PostScript data stream, you can print on an AS/400-connected printer. The AS/400 converts the PostScript data stream to AFP data stream so that it can print on an AS/400 IPDS printer. For example, many Web browsers generate PostScript data streams only. If you are working on a Network Station connected to an AS/400 server, you can print from the browser on an AS/400-supported printer—an IBM 3160, for example.

In order to enable this conversion from PostScript to AFP data stream, you must set the IMGCFG parameter in the printer's device description correctly for that printer.

Table 7. Image Configuration Objects by Printer

Printer	IMGCFG Parameter
IBM 3130, 3160-1 AF Printer (240-pel mode)	*IMGC01
IBM 3130 AF Printer (300-pel mode), 3935 AF Printer	*IMGC02
IBM 3825, 3827, 3828 AF Printer	*IMGC09
IBM 3825, 3827, 3828 AF Printer (w/AFIG)	*IMGC01
IBM 3829 AF Printer	*IMGC01
IBM 3835-001, IBM 3835-002, 3900AF Printer (w/AFIG)	*IMGC05
IBM 3912, 3916 Page Printer with IPDS features (twinax)	*IMGC06
IBM 4028 LaserPrinters	*IMGC06
IBM 4312, 4317, 4324 NP w/IPDS feature (twinax and LAN)	*IMGC06
IBM InfoPrint 20 and InfoPrint 32	*IMGC06
IBM InfoPrint 60	*IMGC03
IBM InfoPrint 62 Model 2	*IMGC05
IBM InfoPrint 62 Model 3	*IMGC06
IBM InfoPrint 3000	*IMGC05
IBM InfoPrint 4000	*IMGC05
IBM InfoPrint 4000 High Resolution	*IMGC06

The following table presents descriptions of the image configuration parameters listed in the previous table.

Table 8. Image Configuration Descriptions

IMGCFG Parameter	IDPS Printer
*IMGC01	IPDS 240-dpi printer
*IMGC02	IPDS 300-dpi printer
*IMGC03	IPDS 600-dpi printer
*IMGC04	IPDS 1200-dpi printer
*IMGC05	IPDS 240-dpi printer with no-print border
*IMGC06	IPDS 300-dpi printer with no-print border
*IMGC07	IPDS 600-dpi printer with no-print border
*IMGC08	IPDS 1200-dpi printer with no-print border
*IMGC09	IPDS 240-dpi printer (IM/1 image)

Table 8. Image Configuration Descriptions (continued)

IMGCFG Parameter	IDPS Printer
*IMGC10	IPDS 240-dpi printer (IM/1 image) with no-print border
*IMGC11	IPDS 240-dpi printer (CCITT G4)

Appendix A. IBM Printers and Compatibility Considerations

This appendix lists IBM Printers for AS/400.

IBM Printers for the AS/400 (Impact - Twinax & ASCII)

Twinax or ASCII Attachment, Impact Printers						
IBM Printer	Rated Speed	Technology	Resolution	Attachment	Emulation/Data Stream	Features
4224-1C2 -3C2	400 cps 600 cps	Dot Matrix 18 wire	144 x 144	Twinax (-1XX), Serial (-3XX)	IPDS (-1XX), ASCII (-3XX)	<i>Withdrawn from Mktg</i> Color
4230-101 -111 -1S2, -102 -4S3, -413	375 cps 375 cps 480 cps 600 cps	Dot Matrix 9 wire	144 x 144	Twinax (-1XX), Twinax OR Serial/Parallel (-4XX),	IPDS (-111,-102,-413), SCS (-101,-1S2,-4S3), ProPrinter or 4224-3XX (-4XX)	Heavy Duty IPDS graphics, bar code Easy to use Dual Twinax/ASCII attachment (-4XX Mods) Very Quiet (53 dBA)
4232-302	600 cps	Dot Matrix 9 wire	144 x 144	Serial or Parallel	ProPrinter or 4224-3XX	Heavy duty Easy to use Very quiet (53 dBA)
4234-08 -12 -09 -13	475 lpm 800 lpm 475 lpm 800 lpm	Dot Band	144 x 144	Twinax (-08,-12), Serial/Parallel (-09,13)	IPDS (-08,-12), ProPrinter (-09,-13)	<i>Replaced by 6400-xxx</i> <i>Withdrawn from Mktg</i> IPDS graphics, bar code
4247-A00 -001 -002	700 cps (-A00, -001), 400 cps (-002)	Dot Matrix 18 wire	144 x 144	Twinax Serial/Parallel LAN via NPS	ASCII (A00) IPDS (-001) SCS (-001) ProPrinter or Epson FX80-1050	Up to 6 inputs 2 continuous forms Up to 8-part forms Quiet (55 dBA)
6400-004 -004P -005 -005P -008 -008P -009 -009P -012 -014	475 lpm 800 lpm 1200 lpm	Line Matrix	Varies by print quality mode	Twinax, Serial/Parallel, LAN via NPS	ProPrinter Printronics Emulation Epson Graphics Opt. SCS, IPDS Opt. Cde V, IGP	Heavy Duty Very Quiet (52 dBA) Low cost of operation Code V, IGP bar code options, IPDS option
6408-CT0 -A00 -CTA	800 lpm	Line Matrix	Varies by print quality mode	Twinax (-CT0), Serial/Parallel (-A00), Twinax OR Serial/Parallel (-CTA)	SCS (-CT0), ProPrinter, Epson Graphics, (-A00) Opt. IPDS (-CTA), Opt. Code V, Opt. IGP	<i>Replaced by 6400-xxx</i> <i>Withdrawn from Mktg</i> Heavy Duty Very Quiet (52 dBA) Low cost of operation Code V, IGP bar code options, IPDS option (-CTA)

Twinax or ASCII Attachment, Impact Printers						
IBM Printer	Rated Speed	Technology	Resolution	Attachment	Emulation/Data Stream	Features
6412-CT0 -A00 -CTA	1200 lpm	Line Matrix	Varies by print quality mode	Twinax (-CT0), Serial/Parallel (-A00), Twinax OR Serial/Parallel (-CTA)	SCS (-CT0), ProPrinter, Epson Graphics, (-A00) Opt. IPDS (-CTA), Opt. Code V, Opt. IGP	Replaced by 6400-xxx <i>Withdrawn from Mktg</i> Heavy Duty Very Quiet (55 dBA) Low cost of operation Code V, IGP bar code options, IPDS option (-CTA)
6252-T08 -T12 -AP8,-AS8 -AP2,-AS2	800 lpm 1200 lpm 800 lpm 1200 lpm	Engraved Character Band	Fixed Character	Twinax (-TXX), Serial/Parallel (-AXX)	SCS (-TXX), ProPrinter (-AXX)	Quiet (55 dBA) Very Small footprint Total front access
6262-T12 -T14 -T22 -A12 -A14 -A22	1200 lpm 1400 lpm 2200 lpm 1200 lpm 1400 lpm 2200 lpm	Engraved Character Band	Fixed Character	Twinax (-TXX), Serial/Parallel (-AXX)	SCS (-TXX), ProPrinter (-AXX)	All except -X22 models withdrawn High speed line printing, High-speed forms stacking, Small footprint
Note: All IBM printers feature round-the-clock IBM maintenance.						

IBM Printers for the AS/400 (Non-Impact - Twinax & ASCII)

Twinax or ASCII Attachment, Non-Impact Printers						
IBM Printer	Rated Speed	Technology	Resolution	Attachment	Emulation/Data Stream	Features
4028-AS1	10 ipm	EP - Laser	300 x 300	Twinax	IPDS	Good AFP Performer Envelope option 20,000 imp/month Cut sheet/simplex
3112-001	12 ipm	EP - Laser	300 x 300, 600 x 600 1,200 x 1,200 (PostScript)	Twinax, Serial/Parallel, Ethernet, Token Ring, LocalTalk	IPDS SCS PCL5e PostScript Lev 2	No longer available Internal INA Option 50,000 imp/month Cut sheet/duplex
3116-001 -002 -003	16 ipm	EP - Laser	300 x 300, 600 x 600 1,200 x 1,200 (PostScript)	Twinax, Serial/Parallel, Ethernet, Token Ring, LocalTalk	IPDS SCS PCL5e PostScript Lev 2	Internal INA Option 50,000 imp/month -001 75,000 imp/month -002 75,000 imp/month -003 Cut sheet/duplex
3912-AS0 -AS1	12 ipm	EP - Laser	300 x 300, 600 x 600 (PostScript)	Twinax, Serial/Parallel Ethernet, Token Ring	IPDS (-AS1) SCS (-AS0) HP-PCL5 PostScript	No longer available Envelope option 50,000 imp/month Cut sheet/duplex
3916-AS0 -AS1	16 ipm	EP - Laser	300 x 300, 600 x 600 (PostScript)	Twinax, Serial/Parallel, Ethernet, Token Ring	IPDS (-AS1) SCS (-AS0) HP-PCL5 PostScript	No longer available Envelope option 75,000 imp/month Cut sheet/duplex

Twinax or ASCII Attachment, Non-Impact Printers						
IBM Printer	Rated Speed	Technology	Resolution	Attachment	Emulation/Data Stream	Features
Network Printer 12 (4312)	12 ipm	EP - Laser	300 x 300 (IPDS), 600 x 600 (PCL, PostScript)	Twinax, Serial/Parallel, Ethernet, Token Ring,	IPDS SCS PCL5e PostScript Lev 2	"Real" IPDS 1 Internal NIC Option Cut sheet/duplex
Network Printer 17 (4317)	17 ipm	EP - Laser	300 x 300 (IPDS), 600 x 600 (PCL, PostScript)	Twinax, Parallel, Ethernet, Token Ring,	IPDS SCS PCL5e PostScript Lev 2	"Real" IPDS 2 Internal NIC Options 10 bin mailbox Cut sheet/duplex
InfoPrint 20	20 ipm	EP - Laser	300 x 300 (IPDS), 600 x 600 (PCL, PostScript)	Twinax, Parallel, Ethernet, Token Ring	IPDS SCS PCL5e PostScript Lev 2	"Real" IPDS 2 Internal NIC Opt. Cut sheet/duplex
Network Printer 24 (4324)	24 ipm	EP - Laser	300 x 300 (IPDS), 600 x 600 (PCL, PostScript)	Twinax, Parallel, Ethernet, Token Ring	IPDS SCS PCL5e PostScript Lev 2	"Real" IPDS 2 Internal NIC Opt. Jogger/Stapler Cut sheet/duplex
InfoPrint 32	32 ipm	EP - Laser	300 x 300 (IPDS), 600 x 600 (PCL, PostScript)	Twinax, Parallel, Ethernet, Token Ring	IPDS SCS PCL5e PostScript Lev 2	"Real" IPDS 2 Internal NIC Opt. Jogger/Stapler Cut sheet/duplex
Network Color Printer (4303)	3 ipm Color, 12 ipm Mono	EP - Laser	600 x 600	Parallel Ethernet	PostScript Lev 2	Limited AS/400 support Photographic color quality EFI Fiery controller RIP-while-print
3816-01S -01D	24 ipm	EP - LED	240 x 240	Twinax or Serial/Parallel	IPDS (twinax), ASCII (Serial/Parallel)	<i>Replaced by 3930</i> Withdrawn from mktg 80,000 imp/month Cut sheet/duplex
3130-01S -02S -02D -03S	30 ipm	EP - Laser	240 x 240 or 300 x 300	Twinax, SNA SDLC, SNA Token Ring, TCP/IP Token Ring or Ethernet	IPDS HP PCL5e PostScript Lev 2	AFCCU control Unit 5 input bins 3 output bins 200,000 imp/month Cut sheet/duplex
3930-02S -02D -03S -03D	30 ipm	EP - LED	240 x 240 (-02X), 300 x 300 (-03X)	Twinax (-02X), Serial/Parallel (-03X), Ethernet (Opt.) (-03X)	IPDS (-02X), PPDS (-03X), HP-PCL5 (-03X), PostScript (Opt) (-03X)	<i>Withdrawn 4/26/96</i> High Reliability, Improved performance over 3816, 150,000 imp/month Cut sheet/duplex
3935-001	35 ipm	EP - Laser	300 x 300	Twinax, SNA Token Ring, SNA SDLC, TCP/IP Token Ring or Ethernet	IPDS	<i>Withdrawn 4/26/96</i> AFCCU control unit 4 input bins 200,000 imp/month Cut sheet/duplex
Note: On all of these printers, duplex is feature or model dependent. All IBM printers feature round-the-clock IBM maintenance.						

IBM Printers for the AS/400 (Production Printers)

High Speed Production Printers						
IBM Printer	Rated Speed	Technology	Resolution	Attachment	Data Stream	Features
3935	35 ipm	EP - Laser	300 x 300	Twinax, SNA Token Ring, SNA SDLC, TCP/IP Token Ring or Ethernet S/370 Channel (PSF/2)	IPDS	<i>Withdrawn 4/26/96</i> AFCCU control unit 4 input bins 200,000 imp/month Cut sheet/duplex
3160	60 ipm	EP - Laser	240 x 240	SNA Token Ring, TCP/IP Token Ring or Ethernet, S/370 Parallel Channel (PSF/2)	IPDS	High speed/capacity AFCCU control unit 4 input bins 750,000 imp/month Cut sheet/duplex
3825	58 ipm	EP - Laser	240 x 240	S/370 Channel (PSF/2 or PSF/6000)	IPDS	<i>No longer available</i> 1 million imp/month Cut sheet/duplex
3828	92 ipm	EP - LED	480 x 480	S/370 Channel (PSF/2 or PSF/6000)	IPDS	High speed MICR printing (uses MICR toner only) 2 million imp/month Cut sheet/duplex
3829	92 ipm	EP - LED	480 x 480	S/370 Channel Emulator/A Adapter (PSF/2 or PSF/6000)	IPDS	High speed cut sheet printing, Smallest footprint in its class, 2 million imp/month Cut sheet/duplex
3835-001 -002	88 ipm (-001), 91 ipm (-002)	EP - Laser	240 x 240	S/370 Channel (PSF/2 or PSF/6000)	IPDS	Reliable paper path, Enhanced print quality (-002), Intelligent Post-Processing 1.8 million imp/month Continuous form
3900-001 ; -0W1 -0W3 -D01, -D02 -DW1, -DW2	229 ipm, 354 ipm (2-up) 232 ipm (2-up) 300 ipm (duplex) 464 ipm (dup, 2-up)	EP - Laser	240 x 240	SNA Token Ring, TCP/IP Token Ring or Ethernet, S/370 Channel (PSF/2 or PSF/6000) Mod -001 is Channel attach only	IPDS	Exceptional reliability High speed, high volume, Enhanced print quality (-001,-0WX), 18" print web (-0WX), Duplex (-DXX), Intelligent Post-Processing, 5.6 million imp/month Continuous form


High Speed Production Printers						
IBM Printer	Rated Speed	Technology	Resolution	Attachment	Data Stream	Features
InfoPrint 60	60 ipm	EP - Laser	600	TCP/IP Token Ring, Ethernet,	IPDS	High speed, high volume, AFCCU control unit, 750,000 imp/month, 2,000-sheet input, Cut sheet/duplex
InfoPrint 62	62 ipm	EP - Flash Fuser	240, 300	TCP/IP Token Ring or Ethernet, S/370 Parallel Channel	IPDS	High speed, high volume, Multiple medias, especially labels AFCCU control unit, 600,000 imp/month, Continuous Form
InfoPrint 3000	112 ipm (ES1) 224 ipm (ED1/ED2)	EP - Laser	480 480/600 600	TCP/IP Token Ring TCP/IP Ethernet, S/390 ESCON Channel FDDI (TCP/IP)	IPDS	High speed, high volume, Continuous Form
InfoPrint 4000 3900 DR1 3900 DR2 ID1/ID2 ID3/ID4 IR1/IR2 IR3/IR4 IS1, IS2	up to 1002 ipm	EP - Laser	240 240/300 480/600 600	TCP/IP Token Ring, TCP/IP Ethernet S/390 ESCON channel, FDDI (TCP/IP)	IPDS	High speed, high volume, Continuous Form
Note: All IBM printers feature round-the-clock IBM maintenance.						

Appendix B. Additional DDS Examples

"Chapter 11. Using Data Description Specifications" on page 127 showed the Super Sun Seeds invoicing with the INVNEW1 program. This example provided a nice electronic invoice, including the tailoring of the invoice pages to the application data. The chapter closed with a discussion of several enhancements that could be made to the invoicing application.

In the following sections, two different invoicing applications, INVNEW2 and INVNEW3, are shown and described. INVNEW2 provides for multiple copies, duplex, and price suppression. INVNEW3 illustrates the use of a floating form, precisely tailoring the invoice form to the data.

Figure 180 shows a sample of the output for INVNEW2.

Customer		Invoice		Invoice		Payment	
Number:		Number:		Date:		Date:	
100		31300		3/13/96		4/13/96	
Ship Via:		Shipped Date:		Terms:		Salesman:	
BEST WAY		3/13/96		NET 30		YOUR PRINTER REP	
1	PK	01100517	SPARTAN SEEDS	2.39	2.39		
9	PK	04569870	NORTHERN LITE BLUE SPRUCE	858.32	7,724.88		
12	EX	11005004	BUSH GREEN SEEDS	2.50	30.00		
12	CT	11005011	LASSO RED SEEDS	892.23	10,706.76		
26	PK	11005018	EARLY BANTAM SEEDS	3.38	9.88		
5	EX	11057893	AFRICAN DAISY, SEEDS	2.35	11.75		
1	PK	15975365	HEAVY OAK	129.09	129.09		
33	EX	32746510	HOPS BREWING LIGHT	1.20	39.60		
6	EA	46578913	SEED SURVEYING SITE	50.00	300.00		
2	EX	56413213	POT POT	7.65	15.30		
80	PK	65412384	SEED SCRUBBER	888.79	71,103.20		
1	PK	84512023	OREGON SPRING TOMATO SEED	.97	.97		
2	DZ	96325874	PINEAPPLE-ORANGE SEEDS	1.29	2.58		
11	EX	98412006	BLACK BEAUTY ZUCCHINI	2.30	25.30		
5	EA	98546320	FROZEN JUICE PROCESSOR	109.90	549.50		
1	CT	00000300	HIGH ALTITUDE WATERMELON	1.01	1.01		
				Thank You Because you have ordered over \$500 of seeds this year, on your next seed order you will receive a 10% discount.			
This invoice overlay designed using IBM APT Utilities/400				Total Due		\$90,652.21	
Return this tear-off strip with your payment.				Make Checks Payable to: Super Sun Seeds			
Payment is due by: 4/13/96				Amount Due is: \$90,652.21			
IMPROVED PRINTING CORP PERFORMANCE BOULEVARD PRINTERSVILLE CO 457892637							

Customer Copy Page 1

Figure 180. INVNEW2 Sample Invoice

INVNEW2 Enhanced Super Sun Seeds Invoicing

In order to produce multiple collated copies of each page, the invoice detail must be stored. Once each logical page is complete, the customer copy, packing list, and file copy can be printed. As each detail record in the invoice file (SEEDDET1) is processed, the fields for the invoice detail line are stored in the DETDS data

structure instead of being printed. This data structure stores up to 48 detail lines. A page is completed either through overflow (38 detail lines for page one, 48 details line for a continuation page) or through end of the customer invoice.

The fields PAGCNT and PAGTYP keep track of the page number and page type, and in combination, determine what kind of page is being printed. INVNEW2 executes the subroutine PAGSR for each page to be printed (customer copy, packing list, and file copy). In turn, the subroutine PRTDET is called to print the invoice line items out of the DETDS data structure. Indicator 51, set for the packing list, controls the suppression of the price and extension fields. A terms and conditions overlay (INVBAC) is printed only on the back of the customer copy. After all the copy pages have been printed, subroutine BLKDET is called to blank the DETDS data structure.

INVNEW2 RPG Source

The RPG source for INVNEW2 is as follows:

```

5763PW1 V3R2M0 960917          SEU SOURCE LISTING 03/03/96 17:47:37      1
SOURCE FILE . . . . . SAMPLER/QRPGSRC
MEMBER . . . . . INVNEW2
SEQNBR*...+... 1 ...+... 2 ...+... 3 ...+... 4 ...+... 5 ...+... 6 ...+... 7 ...+... 8
100      * INVNEW2 - Super Sun Seeds Electronic Invoice
200      *          Example 2
300      *
400      * This is an enhancement to INVNEW1 that adds the following
500      * output functionality:
600      *
700      *      1. Multiple copies of invoice with routing designation -
800      *          "Customer Copy", "Packing List", "File Copy"
900      *      2. Overlay specifying terms and conditions to print on back of
1000     *          customer copy.
1100     *      3. Packing List copy suppresses price information.
1200     *
1300     * This program reads a transaction file (SEEDDETL), retrieves info
1400     * from item master (SEEDITEM) and customer master (SEEDCUST), then
1500     * prints invoices.
1600     *
1700     * Different electronic overlays are used depending on whether this
1800     * is a one page or multi-page invoice, as well as whether there is
1900     * room remaining on the invoice to print a customer offer. The following
2000     * overlays are used:
2100     *
2200     *      INVALL      1-page invoice (full address at top, payment at bottom)
2300     *      INVST      Page 1 of multi-page invoice (no payment at bottom)
2400     *      INVMID      Continuation page (No address, payment at bottom)
2500     *      INVLST      Last page of multi-page invoice
2600     *      INVBAC      Back side Terms and Conditions overlay
2700     *
2800     * Invoice detail lines are processed until either end of customer order
2900     * or end of the page (38 lines for page 1 and 48 lines for continuation
3000     * pages), at which time the invoice page is printed. At end of
3100     * order, a check is made to see if there are more than 18 detail lines
3200     * to print. If there are, that would not leave room in the invoice body
3300     * to print the customer offer. In this case, the page is printed, and a
3400     * new final page is built with the offer and the payment coupon.
3500     *
3600     * The offer is a message (and corresponding image, or page segment) based
3700     * on item sales in the customer master. For example, a flower image
3800     * would print if seed sales exceeded $500.
3900     *
4000     * ENHANCEMENTS:
4100     * =====
4200     *      Electronic printing offers wide opportunities for increasing

```

```

4300      *      the value of your documents. Several additional enhancements
4400      *      that could be made to Example 2 include:
4500      *
4600      *      1. Use of "floating" forms. With DDS dynamic positioning of
4700      *      document elements (ie. line, box, segment, overlay, etc.),
4800      *      the invoice information could be floated. This means that
4900      *      the grid for detail lines is drawn as transactions are
5000      *      processed, and the grid is closed at the end of a specific
5100      *      customer's transactions. All other document elements
5200      *      could be similarly floated.
5300      *      2. Use of multiple input and output bins of the printer to
5400      *      utilize different stock for different pages. For example,
5500      *      the packing list might use stock that embeds a barcoded
5600      *      packing label on it.
5700      *
5800      FSEEDDETLIP E          K          DISK
5900      FSEEDITEMIF E          K          DISK
6000      FSEEDCUSTIF E          K          DISK
6100      FINVNEW2 O E          PRINTER
6200      *
6300      E                      WDS      1  40 24          Text for Offer
6400      E                      CPY       1   3 25          Text for Copy
6500      *
6600      IINVCDETL      01
6700      I                      STNAME          32
6800      I                      CUST# L1
6900      ICUSTDATA      02
7000      IITEMDATA      03
7100      *
7200      * Data structure to store up to 48 detail lines
7300      *
7400      IDETDS          DS                      48
7500      I                      1   40QTY
7600      I                      5   6 UOM
7700      I                      7  140ITEM#
7800      I                      15  39 ITMDES
7900      I                      40  452SELP RC
8000      I                      46  522EXTPRC
8100      *
8200      IBARTOT        DS
8300      I                      1   60CUST#
8400      I                      7  152TOTDUE
8500      *
8600      IPAYDAA        DS
8700      I                      1   20PAYMO
8800      I                      3   40PAYDA
8900      I                      5   60PAYYR
9000      *
9100      * First pass only
9200      *
9300      C          *IN90      IFEQ '0'
9400      C                      SETON          90
9500      C                      EXSR DATESR
9600      C                      EXSR BLKDET
9700      C                      MOVEL 'Page'      PAGCON  4
9800      C                      ENDIF
9900      *
10000     * Start of Customer
10100     *
10200     C          *INL1      IFEQ '1'
10300     C          CUST#      ADD  31200      INVC#   60      Invent Invoice#
10400     C                      Z-ADD0      TOTDUE  92      Reset Totals/Ctrs
10500     C                      Z-ADD0      ITMCNT  30
10600     C                      Z-ADD0      PAGCNT  20
10700     C                      MOVEL ' '      PAGTYP  3
10800     C          CUST#      CHAINSEEDCUST      20      Get Cust Master
10900     C  32      MOVEL ' Same' STNAME      Ship to Name Is Blank

```

11000	C		SETOF		30	
11100	C		Z-ADDZIP	ZIPPN	90	
11200	C		ENDIF			
11300	*					
11400	*	* Process invoice detail				
11500	*					
11600	C	*IN01	CABNE'1'	ENDDDET		Item Processing
11700	C		Z-ADD0	SELPRC		
11800	C	ITM1	CHAINSEEDITEM		21	
11900	C	*IN21	CABEQ'1'	ENDDDET		
12000	C*					
12100	C		ADD 1	ITMCNT		
12200	C		Z-ADD0	EXTPRC		
12300	C	QTY1	MULT SELPRC	EXTPRC	72	
12400	C		Z-ADDQTY1	QTY	40	
12500	C	EXTPRC	ADD TOTDUE	TOTDUE		
12600	C*					
12700	C	ITMCNT	OCUR DETDS			Set up DS
12800	C*					
12900	C	PAGCNT	IFEQ 0			
13000	C	ITMCNT	CABLT38	ENDDDET		38 lines on Page 1
13100	C		ELSE			
13200	C	ITMCNT	CABLT48	ENDDDET		48 lines on Page n
13300	C		ENDIF			
13400	C*					
13500	C		MOVE'OF '	PAGTYP	3	
13600	C		MOVEPCPY,1	PAGNAM	25	
13700	C		ADD 1	PAGCNT		
13800	C		EXSR PAGSR			Print Cust Copy
13900	C*					
14000	C		SETON		51	
14100	C		MOVEPCPY,2	PAGNAM	25	
14200	C		EXSR PAGSR			Packing List
14300	C		SETOF		51	
14400	C*					
14500	C		SETON		52	
14600	C		MOVEPCPY,3	PAGNAM	25	
14700	C		EXSR PAGSR			File Copy
14800	C		SETOF		52	
14900	C*					
15000	C		Z-ADD0	ITMCNT		
15100	C		MOVE ' '	PAGTYP		Reg or OF Page Type
15200	C		EXSR BLKDET			
15300	C	ENDDDET	TAG			
15400	C*					
15500	C*	* End of Customer Invoice				
15600	C*					
15700	CL1	ITMCNT	IFGT 18			No Room for PSEG
15800	CL1		MOVE 'OF '	PAGTYP		OF page
15900	CL1		MOVEPCPY,1	PAGNAM	25	
16000	CL1		ADD 1	PAGCNT		
16100	CL1		EXSR PAGSR			Customer Copy
16200	C*					
16300	CL1		SETON		51	
16400	CL1		MOVEPCPY,2	PAGNAM	25	
16500	CL1		EXSR PAGSR			Packing List
16600	CL1		SETOF		51	
16700	C*					
16800	CL1		SETON		52	
16900	CL1		MOVEPCPY,3	PAGNAM	25	
17000	CL1		EXSR PAGSR			File Copy
17100	CL1		SETOF		52	
17200	CL1		EXSR BLKDET			Blank DS
17300	CL1		ENDIF			
17400	C*					
17500	CL1		MOVE BARTOT	BARPRC	150	Load Totals
17600	CL1		Z-ADDTOTDUE	TOTD02	92	

17700	CL1		MOVE NAME	NAME@2	25	
17800	CL1		MOVE STREET	STRE@2	25	
17900	CL1		MOVE CITY	CITY@2	25	
18000	CL1		MOVE STATE	STAT@2	2	
18100	CL1		MOVE ZIP	ZIP@2	9	
18200	C*					
18300	CL1		EXSR OFFSR			
18400	CL1		MOVE 'END'	PAGTYP		Last Page
18500	CL1		MOVE LCPY,1	PAGNAM		
18600	CL1		ADD 1	PAGCNT		
18700	CL1		EXSR PAGSR			Customer Copy
18800	C*					
18900	CL1		SETON		51	
19000	CL1		MOVE LCPY,2	PAGNAM		
19100	CL1		EXSR PAGSR			Packing List
19200	CL1		SETOF		51	
19300	C*					
19400	CL1		SETON		52	
19500	CL1		MOVE LCPY,3	PAGNAM		
19600	CL1		EXSR PAGSR			File Copy
19700	CL1		SETOF		52	
19800	C*					
19900	C* Based on page number and page type, determines what overlay to					
20000	C* use					
20100	C*					
20200	CSR	PAGSR	BEGSR			
20300	C	PAGTYP	IFEQ 'OF '			
20400	C	PAGCNT	IFEQ 1			
20500	C		MOVE 'INVST	'OVLAY	8	
20600	C		WRITEINVTOP			
20700	C		ELSE			
20800	C		WRITEINVT2			
20900	C		MOVE 'INVMID	'OVLAY		
21000	C		ENDIF			
21100	C		ENDIF			
21200	C*					
21300	C	PAGTYP	IFEQ 'END'			
21400	C	PAGCNT	IFEQ 1			
21500	C		MOVE 'INVAL	'OVLAY	8	
21600	C		WRITEINVTOP			
21700	C		ELSE			
21800	C		WRITEINVT2			
21900	C		MOVE 'INVLST	'OVLAY		
22000	C		ENDIF			
22100	C		ENDIF			
22200	C*					
22300	C		EXSR PRTDET			Print details
22400	C		WRITEPAGEOF			Pg 1 of n Msg
22500	C 30		WRITEOFFER			Write Offer
22600	C 30		WRITEPAGESEG			Write Segment
22700	C	PAGTYP	IFEQ 'END'			
22800	C		WRITEINVBOT			Invoice Totals
22900	C		ENDIF			
23000	C		WRITEPRTOVL			Print Overlay
23100	C		WRITEENDPAG			End Page
23200	C*					
23300	C	PAGNAM	IFEQ CPY,1			
23400	C		MOVE 'INVBAC	'OVLAY	8	Back Overlay
23500	C		WRITEPRTOVL			
23600	C		ENDIF			
23700	C		WRITEENDPAG			
23800	C*					
23900	CSR	ENDP	ENDSR			
24000	C*					
24100	C* Print invoice detail lines from data structure					
24200	C*					
24300	CSR	PRTDET	BEGSR			

24400	C		Z-ADD1	X	20	
24500	C	1	DO 48	X		
24600	C	X	OCUR DETDS			
24700	C	ITEM#	IFGT 0			
24800	C		WRITEDETLIN			
24900	C		ENDIF			
25000	C		END			
25100	CSR		ENDSR			
25200	C*					
25300	C*		Blank out data structure			
25400	C*					
25500	CSR	BLKDET	BEGSR			
25600	C	1	DO 48	X		
25700	C	X	OCUR DETDS			
25800	C		MOVE*BLANKS	UOM		
25900	C		MOVE*BLANKS	ITMDES		
26000	C		Z-ADD0	QTY		
26100	C		Z-ADD0	ITEM#		
26200	C		Z-ADD0	SELPRC		
26300	C		Z-ADD0	EXTPRC		
26400	C		END			
26500	CSR		ENDSR			
26600	C*		Set up Date			
26700	CSR	DATESR	BEGSR			
26800	C		Z-ADDUDAY	PAYDA		
26900	C	UMONTH	ADD 1	PAYMO		
27000	C	PAYMO	IFGT 12			
27100	C		Z-ADD1	PAYMO		
27200	C	UYEAR	ADD 1	PAYYR		
27300	C		ELSE			
27400	C		Z-ADDUYEAR	PAYYR		
27500	C		ENDIF			
27600	C		MOVE PAYDAA	PAYDAT 60		
27700	C		Z-ADDPAYDAT	PAYDA@ 60		
27800	CSR		ENDSR			
27900	*					
28000	*		Set up Offer at end of invoice			
28100	*					
28200	CSR	OFFSR	BEGSR			
28300	C	SLSSD	IFGE 500			
28400	C		Z-ADD1	IX	20	
28500	C		MOVE 'FLWRNB	'PSEG	8	Seed
28600	C		SETON		30	
28700	C		GOTO WRTOFR			
28800	C		ENDIF			
28900	C	SLSFRT	IFGE 500			
29000	C		Z-ADD7	IX		Strawberry
29100	C		MOVE 'STRWNB	'PSEG		
29200	C		SETON		30	
29300	C		GOTO WRTOFR			
29400	C		ENDIF			
29500	C	SLSSUP	IFGE 500			
29600	C		Z-ADD13	IX		
29700	C		MOVE 'TREENB	'PSEG		Tree
29800	C		SETON		30	
29900	C		GOTO WRTOFR			
30000	C		ENDIF			
30100	C	SLSCHM	IFGE 500			
30200	C		Z-ADD19	IX		
30300	C		MOVE 'BETLNB	'PSEG		Beetle
30400	C		SETON		30	
30500	C		GOTO WRTOFR			
30600	C		ENDIF			
30700	C*					
30800	C		GOTO ENDOFR			
30900	C*					
31000	C	WRTOFR	TAG			


```

31100      C                      MOVE WDS,IX      OFFR@1 24      Build Offer Text
31200      C                      ADD 1            IX
31300      C                      MOVE WDS,IX      OFFR@2 24
31400      C                      ADD 1            IX
31500      C                      MOVE WDS,IX      OFFR@3 24
31600      C                      ADD 1            IX
31700      C                      MOVE WDS,IX      OFFR@4 24
31800      C                      ADD 1            IX
31900      C                      MOVE WDS,IX      OFFR@5 24
32000      C                      ADD 1            IX
32100      C                      MOVE WDS,IX      OFFR@6 24
32200      CSR                    ENDOFR          ENDSR
32300      C*
32400      *
32500 ** WDS      WORDS FOR OFFER
32600 Thank You .....
32700 Because you have ordered
32800 over $500 of seeds this
32900 year, on your next seed
33000 order you will receive
33100 a 10% discount.
33200 Thank You .....
33300 Because you have ordered
33400 over $500 of fruit this
33500 year, on your next fruit
33600 order you will receive
33700 a 10% discount.
33800 Thank You .....
33900 Because you have ordered
34000 over $500 of trees this
34100 year, on your next tree
34200 order you will receive
34300 a 10% discount.
34400 Thank You .....
34500 Because you have ordered
34600 over $500 of stuff this
34700 year, on your next stuff
34800 order you will receive
34900 a 10% discount.
35000
35100 ** CPY      Copy Name
35200 Customer Copy
35300 Packing List
35400 File Copy

```

* * * * * E N D O F S O U R C E * * * * *

INVNEW2 DDS Source

The DDS source for INVNEW2 is as follows:

```

5763PW1 V3R2M0 960917                      SEU SOURCE LISTING 03/03/96 17:48:15      1
SOURCE FILE . . . . . SAMPLER/QDDSSRC
MEMBER . . . . . INVNEW2
SEQNBR*...+... 1 ...+... 2 ...+... 3 ...+... 4 ...+... 5 ...+... 6 ...+... 7 ...+... 8
100      A* INVNEW2 - Printer File DDS for Super Sun Seeds Invoice
200      A*                      Example 2 (copies and duplex function added)
300      A*
400      A* Printer File Create or Change Parameters:
500      A* - Printer Device Type (DEVTYPE)          *AFPDS
600      A* - Overflow Line (OVRFLW)                64
700      A* - Print on Both Sides (DUPLEX)          *YES
800      A*      if running on duplex printer
900      A*
1000     A* Page 1 Header
1100     A*- includes Postnet Zip+4
1200     A*
1300     A      R INVTOP                      SKIPB(10)

```

1400	A	ZIPPN	9S	12	BARCODE(POSTNET)
1500	A				SPACEA(2)
1600	A	NAME	25A	12	
1700	A	STNAME	25A	48	
1800	A				SPACEA(1)
1900	A	STREET	25A	12	
2000	A	STSTRT	25A	48	
2100	A				SPACEA(1)
2200	A	CITY	25A	12	
2300	A	STCITY	25A	48	
2400	A				SPACEA(1)
2500	A	STATE	2A	12	
2600	A	ZIP	9S	16	EDTWRD(' - ')
2700	A	STSTE	2A	48	
2800	A	STZIP	9S	52	EDTWRD(' - ')
2900	A				SPACEA(3)
3000	A	CUST#	6S 0	14	EDTCDE(Z)
3100	A	INVC#	6S 0	32	EDTCDE(Z)
3200	A				49DATE EDTCDE(Y)
3300	A	PAYDAT	6S 0	66	EDTCDE(Y)
3400	A				SPACEA(2)
3500	A	SHPVIA	10A	14	
3600	A				34DATE EDTCDE(Y)
3700	A	TERMS	10A	47	
3800	A	SLSMAN	16A	64	
3900	A				SPACEA(4)
4000	A*				
4100	A*	Page 2 Header			
4200	A*				
4300	A	R INVTP2			SKIPB(10)
4400	A	NAME	25A	12	
4500	A				SPACEA(2)
4600	A	CUST#	6S 0	14	EDTCDE(Z)
4700	A	INVC#	6S 0	32	EDTCDE(Z)
4800	A				49DATE EDTCDE(Y)
4900	A	PAYDAT	6S 0	66	EDTCDE(Y)
5000	A				SPACEA(4)
5100	A*				
5200	A*	Detail Lines			
5300	A*				
5400	A	R DETLIN			SPACEA(1)
5500	A	QTY	4S 0	8	EDTCDE(Z)
5600	A	UOM	2A	13	
5700	A	ITEM#	8S 0	18	
5800	A	ITMDES	25A	28	
5900	A N51	SELPRC	6S 2	58	EDTCDE(J)
6000	A N51	EXTPRC	7S 2	70	EDTCDE(J)
6100	A*				
6200	A*	Multipage Message			
6300	A*				
6400	A	R PAGEOF			
6500	A	PAGCON	4A		POSITION(10.7 7.3)
6600	A				FNTCHRSET(C0H200A0 T1V10037)
6700	A	PAGCNT	2S 0		POSITION(10.7 7.8)
6800	A				FNTCHRSET(C0H200A0 T1V10037)
6900	A				EDTCDE(Z)
7000	A	PAGNAM	25A		POSITION(10.7 3.8)
7100	A				FNTCHRSET(C0H400B0 T1V10037)
7200	A*				
7300	A*	Invoice Totals			
7400	A*	- includes Interleaf 2 of 5 barcode			
7500	A*				
7600	A	R INVBOT			SKIPB(51)
7700	A N51	TOTDUE	9S 2	67	EDTWRD(' , , \$0. -')
7800	A				SPACEA(4)
7900	A 51			67	' '
8000	A				SPACEA(4)

```

8100      A          PAYDA@      6S 0    25 EDTCDE(Y)
8200      A N51      TOTD@2      9S 2    67 EDTWRD(' , , $0. -')
8300      A                                     SPACEA(2)
8400      A 51                                     67 ' '
8500      A                                     SPACEA(2)
8600      A          NAME@2      25A      12
8700      A                                     SPACEA(1)
8800      A          STRE@2      25A      12
8900      A          BARPRC      15S 0    52BARCODE(INTERL20F5 3)
9000      A                                     SPACEA(1)
9100      A          CITY@2      25A      12
9200      A                                     SPACEA(1)
9300      A          STAT@2      2A       12
9400      A          ZIP@2       9A       16
9500      A*
9600      A* Offer Print
9700      A* - Font 92 is Courier Italic 12-pitch
9800      A*
9900      A          R OFFER                                     SKIPB(43)
10000     A                                     FONT(92)
10100     A          OFFR@1      24A      36
10200     A                                     SPACEA(1)
10300     A          OFFR@2      24A      36
10400     A                                     SPACEA(1)
10500     A          OFFR@3      24A      36
10600     A                                     SPACEA(1)
10700     A          OFFR@4      24A      36
10800     A                                     SPACEA(1)
10900     A          OFFR@5      24A      36
11000     A                                     SPACEA(1)
11100     A          OFFR@6      24A      36
11200     A                                     SPACEA(1)
11300     A*
11400     A* Images/Page Segments
11500     A* - variable page segment name from program
11600     A*
11700     A          R PAGSEG                                     PAGSEG(&PSEG 7.0 2.6)
11800     A          PSEG              8A P
11900     A*
12000     A*
12100     A* Images/Page Segments
12200     A* - variable overlay name from program
12300     A*
12400     A          R PRTOVL                                     OVERLAY(&OVLAY 0 0)
12500     A          OVLAY              8A P
12600     A*
12700     A* Forces page advance
12800     A*
12900     A          R ENDPAG                                     ENDPAGE
                                     * * * * E N D   O F   S O U R C E   * * * *

```

INVNEW3 Floating Super Sun Seeds Invoicing

This version of the Super Sun Seeds invoice demonstrates a dynamic or “floating” document. It uses the capabilities of variable or dynamic positioning within DDS. The invoice is not limited by the structure of the electronic overlay, but is tailored by the customer data.

Figure 181 on page 298 shows a sample of the output for INVNEW3.

The INVNEW3 program is very similar to INVNEW2, except that it uses variations of the overlays - INVHEAD, INVHEAD2, and INVPAY. It also includes printer file writes as follows:

DTGRID

Extends the vertical lines .167 inches (6 lines per inch) with each detail line

CLOSE

Draws the horizontal line to close the transaction grid

TOTAL

Draws the total box, and prints the totals

INVNEW3 RPG Source

The INVNEW3 RPG source is shown below:

```

5763PW1 V3R2M0 960917          SEU SOURCE LISTING 03/03/96 17:47:38      1
SOURCE FILE . . . . . SAMPLER/QRPGSRC
MEMBER . . . . . INVNEW3
SEQNBR*...+... 1 ...+... 2 ...+... 3 ...+... 4 ...+... 5 ...+... 6 ...+... 7 ...+... 8
100      * INVNEW3 - Super Sun Seeds Electronic Invoice
200      *           Example 3 - Floating Invoice
300      *
400      * This is an enhancement to INVNEW1 and INVNEW2 that adds the
500      * following function:
600      *
700      * 1. Multiple copies of invoice with routing designation -
800      *    "Customer Copy", "Packing List", "File Copy"
900      * 2. Overlay specifying terms and conditions to print on back of
1000     *    customer copy.
1100     * 3. Packing List copy suppresses price information.
1200     * 4. The invoice is a floating document. Only the invoice
1300     *    header and payment coupon are static overlays. The
1400     *    main part of the invoice is built dynamically using
1500     *    line commands. Output format DTGRID extends the vertail
1600     *    lines of the invoice detail area down. Output format
1700     *    CLOSE draws the horizontal line to close the grid. Format
1800     *    TOTAL draws the "Total Due" box.
1900     *
2000     * This program reads a transaction file (SEEDDETL), retrieves info
2100     * from item master (SEEDITEM) and customer master (SEEDCUST), then
2200     * prints invoices.
2300     *
2400     * Different electronic overlays are used depending on whether this
2500     * is a one page or multi-page invoice, as well as whether there is
2600     * room remaining on the invoice to print a customer offer. The following
2700     * overlays are used:
2800     *
2900     * INVHEAD    1-page invoice header
3000     * INVHEAD2  Continuation page invoice header
3100     * INVPAY    Payment coupon at bottom
3200     * INVBAC    Back side Terms and Conditions overlay
3300     *
3400     * Invoice detail lines are processed until either end of customer order
3500     * or end of the page (38 detail lines for page 1, 48 detail lines for
3600     * the continuation pages) is reached. At the end of an order,
3700     * a check is made to see if there are more than 18 detail lines left
3800     * to print. If there are, that would not leave room in the invoice body
3900     * to print the customer offer. In this case, the page is printed, and a
4000     * new final page is built with the offer and the payment coupon.
4100     *
4200     * The offer is a message (and corresponding image, or page segment) based
4300     * on item sales in the customer master. For example, a flower image
4400     * would print if seed sales exceeded $500.
4500     *
```

```

4600      *
4700      FSEEDDETLP E          K          DISK
4800      FSEEDITEMIF E        K          DISK
4900      FSEEDCUSTIF E        K          DISK
5000      FINVNEW3 O  E          PRINTER
5100      *
5200      E                      WDS      1  40 24      Text for Offer
5300      E                      CPY      1  3 25      Text for Copy
5400      *
5500      IINVCDETL      01
5600      I                      STNAME      32
5700      I                      CUST# L1
5800      ICUSTDATA      02
5900      IITEMDATA      03
6000      *
6100      * Data structure to store up to 48 detail lines
6200      *
6300      IDETDS          DS                      48
6400      I                      1  40QTY
6500      I                      5  6 UOM
6600      I                      7 140ITEM#
6700      I                      15 39 ITMDES
6800      I                      40 452SELP RC
6900      I                      46 522EXTPRC
7000      *
7100      * Cust# and Total Amount to print in bar code
7200      *
7300      IBARTOT          DS
7400      I                      1  60CUST#
7500      I                      7 152TOTDUE
7600      *
7700      IPAYDAA          DS
7800      I                      1  20PAYMO
7900      I                      3  40PAYDA
8000      I                      5  60PAYYR
8100      *
8200      * First pass only
8300      *
8400      C          *IN90      IFEQ '0'
8500      C                      SETON                      90
8600      C                      EXSR DATESR
8700      C                      EXSR BLKDET
8800      C                      MOVE'Page'      PAGCON 4
8900      C                      MOVE'Total'      TOTCON 9
9000      C                      MOVE 'Due'      TOTCON 9
9100      C                      ENDIF
9200      *
9300      * Start of Customer
9400      *
9500      C          *INL1      IFEQ '1'
9600      C          CUST#      ADD 31200      INVC# 60      Invent Invoice#
9700      C                      Z-ADD0      TOTDUE 92      Reset Totals/Ctrs
9800      C                      Z-ADD0      ITMCNT 30
9900      C                      Z-ADD0      PAGCNT 20
10000      C                      MOVE' '      PAGTYP 3
10100      C          CUST#      CHAINSEEDCUST      20      Get Cust Master
10200      C 32      MOVE' '      SAME'STNAME
10300      C                      Z-ADDZIP      ZIPPN 90
10400      C                      SETOF      30
10500      C                      ENDIF
10600      *
10700      * Process invoice detail
10800      *
10900      C          *IN01      CABNE'1'      ENDDET
11000      C                      Z-ADD0      SELPRC
11100      C          ITM1      CHAINSEEDITEM      21
11200      C          *IN21      CABEQ'1'      ENDDET

```

11300	C*				
11400	C		ADD 1	ITMCNT	
11500	C		Z-ADD0	EXTPRC	
11600	C	QTY1	MULT SELPRC	EXTPRC	72
11700	C		Z-ADDQTY1	QTY	40
11800	C	EXTPRC	ADD TOTDUE	TOTDUE	
11900	C*				
12000	C*	Load item detail fields into data structure			
12100	C*				
12200	C	ITMCNT	OCUR DETDS		Set up DS
12300	C*				
12400	C*	Check end of page			
12500	C*				
12600	C	PAGCNT	IFEQ 0		
12700	C	ITMCNT	CABLT39	ENDDDET	35 lines on P1
12800	C		ELSE		
12900	C	ITMCNT	CABLT48	ENDDDET	48 lines on Pn
13000	C		ENDIF		
13100	C*				
13200	C*	If end of page, print			
13300	C*				
13400	C		MOVE 'OF '	PAGTYP 3	
13500	C		MOVE LCPY,1	PAGNAM 25	
13600	C		ADD 1	PAGCNT	
13700	C		EXSR PAGSR		Print Cust Copy
13800	C*				
13900	C		SETON		51
14000	C		MOVE LCPY,2	PAGNAM 25	
14100	C		EXSR PAGSR		Packing List
14200	C		SETOF		51
14300	C*				
14400	C		SETON		52
14500	C		MOVE LCPY,3	PAGNAM 25	
14600	C		EXSR PAGSR		File Copy
14700	C		SETOF		52
14800	C*				
14900	C		Z-ADD0	ITMCNT	
15000	C		MOVE ' ' '	PAGTYP	Reg or OF Page
15100	C		EXSR BLKDET		
15200	C	ENDDDET	TAG		
15300	C*				
15400	C*	End of Customer Invoice			
15500	C*				
15600	CL1	ITMCNT	IFGT 18		No Room for PSEG
15700	CL1		MOVE 'OF '	PAGTYP	OF page
15800	CL1		MOVE LCPY,1	PAGNAM 25	
15900	CL1		ADD 1	PAGCNT	
16000	CL1		EXSR PAGSR		Customer Copy
16100	C*				
16200	CL1		SETON		51
16300	CL1		MOVE LCPY,2	PAGNAM 25	
16400	CL1		EXSR PAGSR		Packing List
16500	CL1		SETOF		51
16600	C*				
16700	CL1		SETON		52
16800	CL1		MOVE LCPY,3	PAGNAM 25	
16900	CL1		EXSR PAGSR		File Copy
17000	CL1		SETOF		52
17100	C*				
17200	CL1		EXSR BLKDET		Blank DS
17300	CL1		ENDIF		
17400	C*				
17500	C*	Setup payment coupon fields			
17600	C*				
17700	CL1		MOVE BARTOT	BARPRC 150	
17800	CL1		Z-ADDTOTDUE	TOTD02 92	
17900	CL1		MOVE NAME	NAME02 25	

18000	CL1		MOVE STREET	STRE@2 25	
18100	CL1		MOVE CITY	CITY@2 25	
18200	CL1		MOVE STATE	STAT@2 2	
18300	CL1		MOVE ZIP	ZIP@2 9	
18400	C*				
18500	CL1		EXSR OFFSR		
18600	CL1		MOVE 'END'	PAGTYP	Last Page
18700	CL1		MOVE LCPY,1	PAGNAM	
18800	CL1		ADD 1	PAGCNT	
18900	CL1		EXSR PAGSR		Customer Copy
19000	C*				
19100	CL1		SETON		51
19200	CL1		MOVE LCPY,2	PAGNAM	
19300	CL1		EXSR PAGSR		Packing List
19400	CL1		SETOF		51
19500	C*				
19600	CL1		SETON		52
19700	CL1		MOVE LCPY,3	PAGNAM	
19800	CL1		EXSR PAGSR		File Copy
19900	CL1		SETOF		52
20000	C*				
20100	C* Based on page number and page type, determines what overlay to				
20200	C* use				
20300	C*				
20400	CSR	PAGSR	BEGSR		
20500	C	PAGTYP	IFEQ 'OF '		
20600	C	PAGCNT	IFEQ 1		
20700	C		MOVE 'INVHEAD 'OVLAY	8	Full Header
20800	C		WRITEINVTOP		
20900	C		ELSE		
21000	C		WRITEINVT2		
21100	C		MOVE 'INVHEAD2'OVLAY		Abbrev. Header
21200	C		ENDIF		
21300	C		ENDIF		
21400	C*				
21500	C	PAGTYP	IFEQ 'END'		
21600	C	PAGCNT	IFEQ 1		
21700	C		MOVE 'INVHEAD 'OVLAY	8	Full Header
21800	C		WRITEINVTOP		
21900	C		ELSE		
22000	C		WRITEINVT2		
22100	C		MOVE 'INVHEAD2'OVLAY		Abbrev. Header
22200	C		ENDIF		
22300	C		ENDIF		
22400	C*				
22500	C		EXSR PRDDET		Print details
22600	C		WRITEDTGRID		Extend grid
22700	C		ADD .167	DWN	.167 inch down
22800	C		WRITECLOSE		Close grid
22900	C		WRITEPAGEOF		Pg 1 of n Msg
23000	C 30		WRITEOFFER		Write Offer
23100	C 30		WRITEPAGSEG		Write Segment
23200	C		WRITEPRTOVL		Print Overlay
23300	C*				
23400	C	PAGTYP	IFEQ 'END'		
23500	C		WRITEINVBOT		
23600	C		MOVE 'INVPAY 'OVLAY	8	Invoice Totals
23700	C		WRITEPRTOVL		Print Overlay
23800	C	DWN	ADD .5	DWN2	Offset - Total
23900	C	DWN	ADD .35	DWN3	Box
24000	C		WRITETOTAL		
24100	C		ENDIF		
24200	C*				
24300	C		WRITEENDPAG		End Page
24400	C*				
24500	C	PAGNAM	IFEQ CPY,1		
24600	C		MOVE 'INVBAC 'OVLAY	8	Back Overlay

24700	C		WRITEPRTOVL				
24800	C		ENDIF				
24900	C		WRITEENDPAG				
25000	C*						
25100	CSR	ENDP	ENDSR				
25200	C*						
25300	C*	Print invoice detail lines from DS					
25400	C*						
25500	CSR	PRTDET	BEGSR				
25600	C	PAGCNT	IFEQ 1				
25700	C		Z-ADD3.75	DWN	53		Offset for grid
25800	C		ELSE				
25900	C		Z-ADD2.42	DWN			Offset for grid
26000	C		ENDIF				
26100	C*						
26200	C		Z-ADD1	X	20		
26300	C	1	DO 48	X			
26400	C	X	OCUR DETDS				
26500	C	ITEM#	IFGT 0				
26600	C		WRITEDETLIN				
26700	C		WRITEDTGRID				
26800	C		ADD .167	DWN			
26900	C		ENDIF				
27000	C		END				
27100	CSR		ENDSR				
27200	C*						
27300	C*	Blank out DS					
27400	C*						
27500	CSR	BLKDET	BEGSR				
27600	C	1	DO 48	X			
27700	C	X	OCUR DETDS				
27800	C		MOVE*BLANKS	UOM			
27900	C		MOVE*BLANKS	ITMDES			
28000	C		Z-ADD0	QTY			
28100	C		Z-ADD0	ITEM#			
28200	C		Z-ADD0	SELPRC			
28300	C		Z-ADD0	EXTPRC			
28400	C		END				
28500	CSR		ENDSR				
28600	C*	Set up Date					
28700	CSR	DATESR	BEGSR				
28800	C		Z-ADDUDAY	PAYDA			
28900	C	UMONTH	ADD 1	PAYMO			
29000	C	PAYMO	IFGT 12				
29100	C		Z-ADD1	PAYMO			
29200	C	UYEAR	ADD 1	PAYYR			
29300	C		ELSE				
29400	C		Z-ADDUYEAR	PAYYR			
29500	C		ENDIF				
29600	C		MOVE PAYDAA	PAYDAT	60		
29700	C		Z-ADDPAYDAT	PAYDA0	60		
29800	CSR		ENDSR				
29900	C*	Set up Offer at end of invoice					
30000	CSR	OFFSR	BEGSR				
30100	C	SLSSD	IFGE 500				
30200	C		Z-ADD1	IX	20		
30300	C		MOVE 'FLWRNB	'PSEG	8		Seed
30400	C		SETON		30		
30500	C		GOTO WRTOFR				
30600	C		ENDIF				
30700	C	SLSFRT	IFGE 500				
30800	C		Z-ADD7	IX			Strawberry
30900	C		MOVE 'STRWNB	'PSEG			
31000	C		SETON		30		
31100	C		GOTO WRTOFR				
31200	C		ENDIF				
31300	C	SLSSUP	IFGE 500				

```

31400      C                      Z-ADD13      IX
31500      C                      MOVE 'TREENB 'PSEG      30      Tree
31600      C                      SETON
31700      C                      GOTO WRTOFR
31800      C                      ENDIF
31900      C                      SLSCHM      IFGE 500
32000      C                      Z-ADD19      IX
32100      C                      MOVE 'BETLNB 'PSEG      30      Beetle
32200      C                      SETON
32300      C                      GOTO WRTOFR
32400      C                      ENDIF
32500      C*
32600      C                      GOTO ENDOFR
32700      C*
32800      C                      WRTOFR      TAG
32900      C                      MOVE WDS,IX      OFFR01 24      Build Offer Text
33000      C                      ADD 1      IX
33100      C                      MOVE WDS,IX      OFFR02 24
33200      C                      ADD 1      IX
33300      C                      MOVE WDS,IX      OFFR03 24
33400      C                      ADD 1      IX
33500      C                      MOVE WDS,IX      OFFR04 24
33600      C                      ADD 1      IX
33700      C                      MOVE WDS,IX      OFFR05 24
33800      C                      ADD 1      IX
33900      C                      MOVE WDS,IX      OFFR06 24
34000      CSR                      ENDOFR      ENDSR
34100      C*
34200      *
34300      ** WDS      WORDS FOR OFFER
34400      Thank You .....
34500      Because you have ordered
34600      over $500 of seeds this
34700      year, on your next seed
34800      order you will receive
34900      a 10% discount.
35000      Thank You .....
35100      Because you have ordered
35200      over $500 of fruit this
35300      year, on your next fruit
35400      order you will receive
35500      a 10% discount.
35600      Thank You .....
35700      Because you have ordered
35800      over $500 of trees this
35900      year, on your next tree
36000      order you will receive
36100      a 10% discount.
36200      Thank You .....
36300      Because you have ordered
36400      over $500 of stuff this
36500      year, on your next stuff
36600      order you will receive
36700      a 10% discount.
36800
36900      ** CPY      Copy Name
37000      Customer Copy
37100      Packing List
37200      File Copy

```

* * * * * E N D O F S O U R C E * * * * *

INVNEW3 DDS Source

In the INVNEW3 DDS source, several program variables (&DWN, &DWN2, and &DWN3) are used to control spacing down the page for the DTGRID, CLOSE, and TOTAL record formats.

The INVNEW3 DDS printer file source is shown below:

```

5763PW1 V3R2M0 960917          SEU SOURCE LISTING 03/03/96 17:48:16      1
SOURCE FILE . . . . . SAMPLER/QDDSSRC
MEMBER . . . . . INVNEW3
SEQNBR*...+... 1 ...+... 2 ...+... 3 ...+... 4 ...+... 5 ...+... 6 ...+... 7 ...+... 8
100  A* INVNEW3 - Printer File DDS for Super Sun Seeds Invoice
200  A*      Example 3 (floating grid)
300  A*
400  A* Printer File Create or Change Parameters:
500  A* - Printer Device Type (DEVTYPE)      *AFPDS
600  A* - Overflow Line (OVRFLW)             64
700  A* - Print on Both Sides (DUPLEX)       *YES
800  A*      if running on duplex printer
900  A*
1000 A* Page 1 Header
1100 A*- includes Postnet Zip+4
1200 A*
1300 A          R INVTOP                      SKIPB(10)
1400 A          ZIPPN                        9S      12 BARCODE(POSTNET)
1500 A                                     SPACEA(2)
1600 A          NAME                        25A      12
1700 A          STNAME                      25A      48
1800 A                                     SPACEA(1)
1900 A          STREET                     25A      12
2000 A          STSTRT                     25A      48
2100 A                                     SPACEA(1)
2200 A          CITY                       25A      12
2300 A          STCITY                     25A      48
2400 A                                     SPACEA(1)
2500 A          STATE                      2A       12
2600 A          ZIP                        9S      16 EDTWRD(' - ')
2700 A          STSTE                      2A      48
2800 A          STZIP                      9S     52 EDTWRD(' - ')
2900 A                                     SPACEA(3)
3000 A          CUST#                      6S 0     14 EDTCDE(Z)
3100 A          INVC#                      6S 0     32 EDTCDE(Z)
3200 A                                     49DATE EDTCDE(Y)
3300 A          PAYDAT                     6S 0     66EDTCDE(Y)
3400 A                                     SPACEA(2)
3500 A          SHPVIA                     10A      14
3600 A                                     34DATE EDTCDE(Y)
3700 A          TERMS                      10A      47
3800 A          SLSMAN                     16A      64
3900 A                                     SPACEA(4)
4000 A*
4100 A* Page 2 Header
4200 A*
4300 A          R INVTP2                      SKIPB(10)
4400 A          NAME                        25A      12
4500 A                                     SPACEA(2)
4600 A          CUST#                      6S 0     14 EDTCDE(Z)
4700 A          INVC#                      6S 0     32 EDTCDE(Z)
4800 A                                     49DATE EDTCDE(Y)
4900 A          PAYDAT                     6S 0     66EDTCDE(Y)
5000 A                                     SPACEA(4)
5100 A*
5200 A* Detail Lines
5300 A*
5400 A          R DETLIN                      SPACEA(1)
5500 A          QTY                        4S 0      8 EDTCDE(Z)
5600 A          UOM                        2A       13
5700 A          ITEM#                      8S 0     18
5800 A          ITMDES                     25A     28
5900 A N51      SELPRC                     6S 2     58 EDTCDE(J)
6000 A N51      EXTPRC                     7S 2     70 EDTCDE(J)
6100 A*
6200 A* Floating Grid

```

6300	A*			
6400	A	R DTGRID		
6500	A			LINE(&DWN .55 0.167 *VRT *NARROW)
6600	A			LINE(&DWN 1.15 0.167 *VRT *NARROW)
6700	A			LINE(&DWN 1.55 0.167 *VRT *NARROW)
6800	A			LINE(&DWN 2.55 0.167 *VRT *NARROW)
6900	A			LINE(&DWN 5.65 0.167 *VRT *NARROW)
7000	A			LINE(&DWN 6.55 0.167 *VRT *NARROW)
7100	A			LINE(&DWN 7.94 0.167 *VRT *NARROW)
7200	A	DWN	5S 3P	
7300	A*			
7400	A*	Close Grid		
7500	A*			
7600	A	R CLOSE		
7700	A			LINE(&DWN .55 7.40 *HRZ *NARROW)
7800	A	DWN	5S 3P	
7900	A*			
8000	A*	Total Box		
8100	A*			
8200	A	R TOTAL		
8300	A			LINE(&DWN 6.55 0.5 *VRT *NARROW)
8400	A			LINE(&DWN 7.93 0.5 *VRT *NARROW)
8500	A			LINE(&DWN2 6.55 1.4 *HRZ *NARROW)
8600	A	TOTCON	9A	POSITION(&DWN3 5.1)
8700	A			FNTCHRSET(C0H200A0 T1V10037)
8800	A N51	TOTDUE	9S 2	EDTWRD(' , , \$0. -')
8900	A			POSITION(&DWN3 6.5)
9000	A	DWN	5S 3P	
9100	A	DWN2	5S 3P	
9200	A	DWN3	5S 3P	
9300	A*			
9400	A*	Multipage Message		
9500	A*			
9600	A	R PAGEOF		
9700	A	PAGCON	4A	POSITION(10.7 7.3)
9800	A			FNTCHRSET(C0H200A0 T1V10037)
9900	A	PAGCNT	2S 0	POSITION(10.7 7.8)
10000	A			FNTCHRSET(C0H200A0 T1V10037)
10100	A			EDTCDE(Z)
10200	A	PAGNAM	25A	POSITION(10.7 3.8)
10300	A			FNTCHRSET(C0H400B0 T1V10037)
10400	A*			
10500	A*	Invoice Totals		
10600	A*	- includes Interleaf 2 of 5 barcode		
10700	A*			
10800	A	R INVBOT		SKIPB(55)
10900	A	PAYDA0	6S 0	25 EDTCDE(Y)
11000	A N51	TOTD02	9S 2	67 EDTWRD(' , , \$0. -')
11100	A			SPACEA(2)
11200	A 51			67 ' '
11300	A			SPACEA(2)
11400	A	NAME02	25A	12
11500	A			SPACEA(1)
11600	A	STRE02	25A	12
11700	A	BARPRC	15S 0	52BARCODE(INTERL20F5 3)
11800	A			SPACEA(1)
11900	A	CITY02	25A	12
12000	A			SPACEA(1)
12100	A	STAT02	2A	12
12200	A	ZIP02	9A	16
12300	A*			
12400	A*	Offer Print		
12500	A*	- Font 92 is Courier Italic 12-pitch		
12600	A*			
12700	A	R OFFER		SKIPB(43)
12800	A			FONT(92)
12900	A	OFFR01	24A	36

```

13000      A                                SPACEA(1)
13100      A          OFFR@2      24A      36
13200      A                                SPACEA(1)
13300      A          OFFR@3      24A      36
13400      A                                SPACEA(1)
13500      A          OFFR@4      24A      36
13600      A                                SPACEA(1)
13700      A          OFFR@5      24A      36
13800      A                                SPACEA(1)
13900      A          OFFR@6      24A      36
14000      A                                SPACEA(1)
14100      A*
14200      A* Images/Page Segments
14300      A* - variable page segment name from program
14400      A*
14500      A          R PAGSEG                                PAGSEG(&PSEG 7.0 2.6)
14600      A          PSEG                                8A P
14700      A*
14800      A*
14900      A* Images/Page Segments
15000      A* - variable overlay name from program
15100      A*
15200      A          R PRTOVL                                OVERLAY(&OVLAY 0 0)
15300      A          OVLAY                                8A P
15400      A*
15500      A          R ENDPAG                                ENDPAGE
                                * * * * E N D   O F   S O U R C E * * * *

```

Appendix C. Setting Up the Client Access/400 Viewer to View AFP Resources

Client Access/400 supports viewing AS/400 spooled files on personal computer (PC) displays. This enables you to see what your spooled file looks like before you print it.

The Viewer that is shipped with Client Access/400 Optimized for Windows 95/NT Mod3 is able to view AFP resources (overlays and page segments) automatically. However, the Viewer that is shipped with previous releases of the Optimized client, as well as all versions of the client for Window 3.1 and OS/2, requires that AFP resources be copied manually to a shared folder or PC hard drive to be viewed with the spooled file. Before you can use the Client Access/400 Viewer to display a spooled file with AFP resources included in it, you must complete the following setup procedure:

1. Modify the Client Access/400 Viewer initialization file to specify which PC or shared folder directory contains the needed AFP resources: The following instructions assume you are storing resources in a shared folder.
 - a. On the AS/400, create a folder to store your resources in. At the AS/400 command line, type CRTFLR and press Enter. Specify the following:
FOLDER
Resource (folder name)
INFOLDER
*NONE
TEXT DESC.
'Folder for AFP Resources for Viewer'
 - b. From the Windows desktop, double-click on the MS-DOS prompt icon on the Main window.
 - c. At the C:\WINDOWS prompt, type CD\CAWIN and press Enter to change to the Client Access/400 for Windows directory.
 - d. At the C:\CAWIN prompt, type E EHNSPORT.INI or CWBSPORT.INI and press Enter to start an editor that enables you to change the Client Access/400 Viewer initialization file.
 - e. Page down in the Client Access/400 Viewer initialization file until you find the Preferences section. Add the following entries to the bottom of the Preferences section (you can add lines by placing the cursor before the position where you want lines to be added and then pressing Enter):
ResourceDataPath=I:\QDLS\RESOURCE
ExportExt=*.OLY
PageSegExt=*.PSG

where RESOURCE is the folder you defined earlier.
 - f. Check the PaperSize setting in the SFLVIEW section of the Client Access/400 Viewer initialization file. If this value is anything other than 0, reset it to 0. A value of 0 ensures that your spooled files will be displayed as letter size (8.5 x 11) pages.
 - g. Press F4 to file the revised EHNSPORT.INI or CWBSPORT.INI file and exit the editor.
2. Copy all needed AFP resources into the shared folder (described earlier).
If your AFP resources were created using a PC package or the IBM AFP Printer Driver for Windows, then you probably already have a copy of them either on

your PC or in a shared folder. If you do, then the only setup required is to ensure that in the Client Access/400 initialization file, EHNSPORT.INI or CWBSPORT.INI, the Resource Data Path is pointing to the directory that contains the resources. This was described in the first step above.

If your AFP resources were created on the AS/400 using Advanced Function Printing Utilities for AS/400 or if you received them as *OVL or *PAGSEG objects from an application service provider, you will need to perform two steps for each resource:

- a. Convert the resource into a physical file member. This removes the AS/400-specific object code from the resource, enabling it to be viewed on a PC. This is sometimes referred to as “de-objectizing”.

Note: This step requires Advanced Function Printing Utilities for AS/400.

- b. Copy the “de-objectized” resource into a shared folder that can be accessed by a PC.

Use the following procedure for AS/400 *OVL or *PAGSEG resources:

- a. Copy page segments to a file that can be used by the PC. With the Advanced Function Printing Utilities for AS/400 installed, you can copy page segments to a shared folder as follows:
 - 1) Click on your AS/400 window to activate it.
 - 2) If Advanced Function Printing Utilities for AS/400 is not active, start it again by typing the command STRAFPU and then pressing Enter.
 - 3) Select option 23 to Work with Page Segments.
 - 4) Select option 9 to Convert to File (you also can use the CVTPAGSPFM command).

Convert Page Segment to PFM (CVTPAGSPFM)

Type choices, press Enter.

Page segment	PAGSEG	>	PSENAME
Library		>	MYLIB
Format of data	DTAFMT	>	*CONTINUOUS
To file	FILE	>	psegtemp
Library			mylib
To member	MBR		*PAGSEG
Text 'description'	TEXT		*PSGTXT
Replace	REPLACE	>	*YES
Create file	CRTFILE	>	*YES
Text 'description'	FILETEXT		*BLANK

Bottom

F3=Exit F4=Prompt F5=Refresh F12=Cancel F13=How to use this display
F24=More keys

Figure 183. Convert Page Segment

- b. Copy this file into a PC document in your shared folder.
 - 1) At the AS/400 command line, type CPYTOPCD and press Enter.

Copy To PC Document (CPYTOPCD)

Type choices, press Enter.

From file	FROMFILE	> psegtemp
Library		mylib
To folder	TOFLR	resource
From member	FROMMBR	*FIRST
To document	TODOC	psegname.psg
Replace document	REPLACE	*yes
Translate table	TRNTBL	*none
Library		
Format of PC data	TRNFMT	*notext

Bottom

F3=Exit F4=Prompt F5=Refresh F10=Additional parameters F12=Cancel
F13=How to use this display F24=More keys

Figure 184. Copy to PC Document

- c. Copy overlays to a file that can be used by the PC. With the Advanced Function Printing Utilities for AS/400 installed, you can copy overlays to a shared folder as follows:
 - 1) Click on your AS/400 window to activate it.
 - 2) If Advanced Function Printing Utilities for AS/400 is not active, start it again by typing the command STRAFPU and then pressing Enter.
 - 3) Select option 22 to Work with Overlays.
 - 4) Select option 9 to Convert to File (you also can use the CVTOVLPM command).

Convert Overlay to PFM (CVTOVLPM)

Type choices, press Enter.

Overlay	OVL	ovlname
Library		mylib
Format of data	DTAFMT	*continuous
To file	FILE	ovltemp
Library		mylib
To member	MBR	*OVL
Text 'description'	TEXT	*OVLTXT
Replace	REPLACE	*yes
Create file	CRTFILE	*yes

Bottom

F3=Exit F4=Prompt F5=Refresh F12=Cancel F13=How to use this display
F24=More keys

Figure 185. Convert Overlay to Physical File Member

- d. Copy this file into a PC document in your shared folder.
 - 1) At the AS/400 command line, type CPYTOPCD and press Enter.

Copy To PC Document (CPYTOPCD)

Type choices, press Enter.

From file FROMFILE

Library

To folder TOFLR

From member FROMMBR

To document TODOC

Replace document REPLACE

Translate table TRNTBL

Library

Format of PC data TRNFMT

> ovltmp

> MYLIB

> RESOURCE

> *FIRST

> ovlname.oly

> *YES

> *NONE

> *NOTEXT

Bottom

F3=Exit F4=Prompt F5=Refresh F10=Additional parameters F12=Cancel

F13=How to use this display F24=More keys

Figure 186. Copy to PC Document

Appendix D. Page Definitions Supplied by PSF/400

This appendix describes the page definitions supplied with PSF/400. Page definitions are available for the various paper sizes used by the printers supported by PSF/400. For information about the paper sizes your printer uses, refer to your printer publications.

Page Definitions for IPDS Matrix Printers

The IPDS Matrix printers include those listed below:

- 4224
- 4230
- 4234
- 4247
- 6400 (All Models)
- 6408
- 6412

Page definitions for IPDS Matrix printers are supplied for formatting some of the more common paper sizes, as shown in the following tables. These page definitions are designed for printing on continuous-forms paper. They are *not* designed for printing on the 4224, 4230, or 4247 with cut-sheet paper or with the document-on-demand device feature.

The IPDS Matrix printers support different fonts, depending on the print quality level set for the printer. Therefore, be sure to select a font that is supported at the print quality level set for your printer. Refer to *Advanced Function Presentation: Printer Information* for more information. Each of these page definitions assigns a channel-1 (carriage) control character to the first line of the page.

Table 9 describes the page definitions for continuous-forms paper that measures 12 × 8.5 inches.

Table 9. Page Definitions for Continuous-Forms Paper 12 by 8.5-Inches

Page Definition Name	Printable Area: Width by Height, In Inches	Print Lines Per Page	Page Position: ³ Down/Across	Recommended Font	Printing Direction	Page Presentation
P1J04964	10.67 × 8.17	49 at 6 lpi	30/0	GT10	Across	Landscape
P1J06484	10.67 × 8.17	64 at 8.01 lpi	30/0	GT12	Across	Landscape

Table 10 on page 314 describes the page definitions for continuous-forms paper that measures 9.5 × 11 inches.

3. Position down and position across are shown in logical units, with 240 logical units per inch. For example, 24 logical units is equal to .10 inch. Measurements specified in logical units are the same for all PSF/400-supported printers, regardless of the resolution or pel density of the printer.

Table 10. Page Definitions for Continuous-Forms Paper 9.5 by 11-Inches

Page Definition Name	Printable Area: Width by Height, In Inches	Print Lines Per Page	Page Position: ³ Down/Across	Recommended Font	Printing Direction	Page Presentation
P1A06462	8.17 × 10.67	64 at 6 lpi	30/0	GT10	Across	Portrait
P1A08584	8.17 × 10.67	85 at 8.01 lpi	30/0	GT12	Across	Portrait

Table 11 describes the page definitions for continuous-forms paper 14.88 × 11 inches. The width of the printable area in these page definitions is 13.2 inches for the 4224, 4230, 4234, and 6412 printers, and 13.6 inches for the 6408 and all models of the 6400 printers. To print records having a line length of 13.2 inches (for example, 132-byte records printed with a GT10 font) you must use a form definition that positions the page at the left margin.

Table 11. Page Definitions for Continuous-Forms Paper 14.88 by 11-Inches

Page Definition Name	Printable Area: Width by Height, In Inches	Print Lines Per Page	Page Position: ³ Down/Across	Recommended Font	Printing Direction	Page Presentation
P1L06464	13.2 × 10.67	64 at 6 lpi	30/0	GT10	Across	Landscape
P1L08584	13.2 × 10.67	85 at 8.01 lpi	30/0	GT12	Across	Landscape

Page Definitions for PCL4 and PPDS Printers

Page definitions for PCL4 and PPDS printers are supplied for formatting some of the more common paper sizes, as shown in the following tables. These page definitions must be used in combination with the form definitions for PCL4 and PPDS printers. For information about the paper sizes supported for your printer, refer to your printer publications.

Each of these page definitions specifies a channel-1 (carriage) control character to position at the top of the next page.

The following table describes the page definitions for cut-sheet A4 paper, which is 8.27 inches wide by 11.69 inches high.

Table 12. Page Definitions for A4 Paper

Name	Printable Area Width by Height, In Inches	Print Lines Per Page	Page Position: ³ Down/Across	Recommended Font	Printing Direction	Page Presentation
P1Q09182	7.77 × 11.29	91 at 8.2 lpi	25/0	GT12	Across	Portrait
P1X04863	10.60 × 7.77	48 at 6.1 lpi	30/0	GT10	Down	Landscape
P1X06483	10.60 × 7.77	64 at 8.2 lpi	24/0	GT12	Down	Landscape
P1X06683	10.60 × 7.77	66 at 8.5 lpi	24/224 ⁴	GT15	Down	Landscape

The following table describes the page definitions for cut-sheet B4 paper, which is 10.12 inches wide by 14.33 inches high.

4. The user-printable area is 9.67 × 7.77 because of the 224 logical unit offset in the Position Down/Position Across column.

Table 13. Page Definitions for B4 Paper

Name	Printable Area Width by Height, In Inches	Print Lines Per Page	Page Position: ³ Down/Across	Recommended Font	Printing Direction	Page Presentation
P1T08362	9.62 × 13.93	83 at 6 lpi	30/0	GT10	Across	Portrait
P1T11382	9.62 × 13.93	113 at 8.2 lpi	24/0	GT12	Across	Portrait
P1T05963	13.93 × 9.62	59 at 6.1 lpi	30/0	GT10	Down	Landscape
P1T07983	13.93 × 9.62	79 at 8.2 lpi	24/0	GT12	Down	Landscape

The following table describes the page definitions for cut-sheet letter paper, which is 8.5 inches wide by 11 inches wide.

Table 14. Page Definitions for Letter Paper

Name	Printable Area Width by Height, In Inches	Print Lines Per Page	Page Position: ³ Down/Across	Recommended Font	Printing Direction	Page Presentation
P1P06362	8.00 × 10.60	63 at 6 lpi	30/0	GT10	Across	Portrait
P1P08682	8.00 × 10.60	86 at 8.2 lpi	24/0	GT12	Across	Portrait
P1X04763	10.60 × 7.77	47 at 6.1 lpi	30/0	GT10	Down	Landscape
P1X06483	10.60 × 7.77	64 at 8.2 lpi	24/0	GT12	Down	Landscape
P1X06683	10.60 × 7.77	66 at 8.5 lpi	24/224 ⁴	GT15	Down	Landscape

The following table describes the page definitions for cut-sheet legal paper, which is 8.5 inches wide by 14 inches high.

Table 15. Page Definitions for Legal Paper

Name	Printable Area Width by Height, In Inches	Print Lines Per Page	Page Position: ³ Down/Across	Recommended Font	Printing Direction	Page Presentation
P1R08162	8.00 × 13.60	81 at 6 lpi	30/0	GT10	Across	Portrait
P1R11082	8.00 × 13.60	110 at 8.2 lpi	24/0	GT12	Across	Portrait
P1R04763	13.60 × 8.00	47 at 6 lpi	30/0	GT10	Down	Landscape
P1R06683	13.60 × 8.00	66 at 8.2 lpi	24/0	GT12	Down	Landscape

Page Definitions for All Other PSF/400-Supported Printers

Table 16 on page 316 describe the page definitions supplied with PSF/400 for all printers other than the IPDS Matrix, and PCL4 and PPDS printers. PSF/400 provides common page definitions for printers other than these three to promote interchange of documents between different printers.

PSF/400 provides page definitions to format the commonly-used cut-sheet and continuous-forms paper sizes. The following tables show the page definitions for each paper size. For information about the paper sizes supported for your printer, refer to your printer publications.

Each of these page definitions specifies a channel-1 (carriage) control character to position at the top of the next page.

Table 16 describes the page definitions for cut-sheet A4 paper, which is 8.27 inches wide by 11.69 inches high.

Table 16. Page Definitions for A4 Paper

Page Definition Name	Printable Area Width by Height, In Inches	Print Lines Per Page	Page Position: ³ Down/Across	Recommended Font	Printing Direction	Page Presentation
P1C09182	7.94 × 11.36	91 at 8.2 lpi	25/0	GT12	Across	Portrait
P1V04863	10.67 × 7.94	48 at 6.1 lpi	30/0	GT10	Down	Landscape
P1V06483	10.67 × 7.94	64 at 8.2 lpi	24/0	GT12	Down	Landscape
P1V06683	10.67 × 7.94	66 at 8.5 lpi	24/224 ⁵	GT15	Down	Landscape

Table 17 describes the page definitions for cut-sheet B4 paper, which is 10.12 inches wide by 14.33 inches high.

Table 17. Page Definitions for B4 Paper

Page Definition Name	Printable Area Width by Height, In Inches	Print Lines Per Page	Page Position: ³ Down/Across	Recommended Font	Printing Direction	Page Presentation
P1D08462	9.79 × 14	84 at 6 lpi	30/0	GT10	Across	Portrait
P1D11382	9.79 × 14	113 at 8.2 lpi	24/0	GT12	Across	Portrait
P1D06063	14 × 9.79	60 at 6.1 lpi	30/0	GT10	Down	Landscape
P1D08083	14 × 9.79	80 at 8.2 lpi	24/0	GT12	Down	Landscape

Table 18 describes the page definitions for any of the following paper sizes:

- Cut-sheet: Letter, which is 8.5 inches wide by 11 inches high
- Continuous-forms: 12 inches wide by 8.5 inches high
- Continuous-forms: 9.5 inches wide by 11 inches high

Table 18. Page Definitions for Letter and Continuous-Forms Paper 12 x 8.5-Inches or 9.5 x 11-Inches

Page Definition Name	Printable Area Width by Height, In Inches	Print Lines Per Page	Page Position: ³ Down/Across	Recommended Font	Printing Direction	Page Presentation
P1A06462	8.17 × 10.67	64 at 6 lpi	30/0	GT10	Across	Portrait
P1A08682	8.17 × 10.67	86 at 8.2 lpi	24/0	GT12	Across	Portrait
P1V04863	10.67 × 7.94	48 at 6.1 lpi	30/0	GT10	Down	Landscape
P1V06483	10.67 × 7.94	64 at 8.2 lpi	24/0	GT12	Down	Landscape
P1V06683	10.67 × 7.94	66 at 8.5 lpi	24/224 ⁵	GT15	Down	Landscape

Table 19 on page 317 describes the page definitions for any of the following paper sizes:

- Cut-sheet: Legal, which is 8.5 inches wide by 14 inches high
- Continuous-forms: 14.88 inches wide by 11 inches high

5. The user printable area is 9.74 × 7.94 because of the 224 logical unit offset in Position Down/Position Across column.

Table 19. Page Definitions for Legal and Continuous-Forms Paper 14.88 x 11-Inches

Page Definition Name	Printable Area Width by Height, in Inches	Print Lines Per Page	Page Position: ³ Down/Across	Recommended Font	Printing Direction	Page Presentation
P1B08262	8.17 × 13.67	82 at 6 lpi	30/0	GT10	Across	Portrait
P1B11082	8.17 × 13.67	110 at 8.2 lpi	24/0	GT12	Across	Portrait
P1B04963	13.67 × 8.17	49 at 6 lpi	30/0	GT10	Down	Landscape
P1B06683	13.67 × 8.17	66 at 8.2 lpi	24/0	GT12	Down	Landscape

Table 20 describes the page definitions for multiple-up printing on any of the following paper sizes:

- Cut-sheet: Letter, which is 8.5 inches wide by 11 inches high
- Cut-sheet: A4, which is 8.27 inches wide by 11.69 inches high
- Continuous-forms: 12 inches wide by 8.5 inches high
- Continuous-forms: 9.5 inches wide by 11 inches high

Table 20. Multiple-Up Page Definitions

Page Definition Name	Printable Area Width by Height, in Inches	Print Lines Per Page	Page Position: ³ Down/Across	Recommended Font	Printing Direction	Page Presentation
P1W120C2	7.94 × 10.67	60 at 12 lpi 60 at 12 lpi	16/160 1344/160	GT20	Across	Portrait: Over/Under
P1W12883	10.67 × 7.94	64 at 8.2 lpi 64 at 8.2 lpi	24/0 24/1281	GT15	Down	Landscape: Side-by-Side
P1W240F3	10.67 × 7.94	60 at 15.2 lpi 60 at 15.2 lpi 60 at 15.2 lpi 60 at 15.2 lpi	16/48 968/48 16/1322 968/1322	GT24	Down	Landscape: Over/Under Side-by-Side

The phrases *Side-by-Side* and *Over/Under* in Table 20 describe the placement of the subpages, which appear as separate logical pages on the physical page, as shown in Figure 187 on page 318.

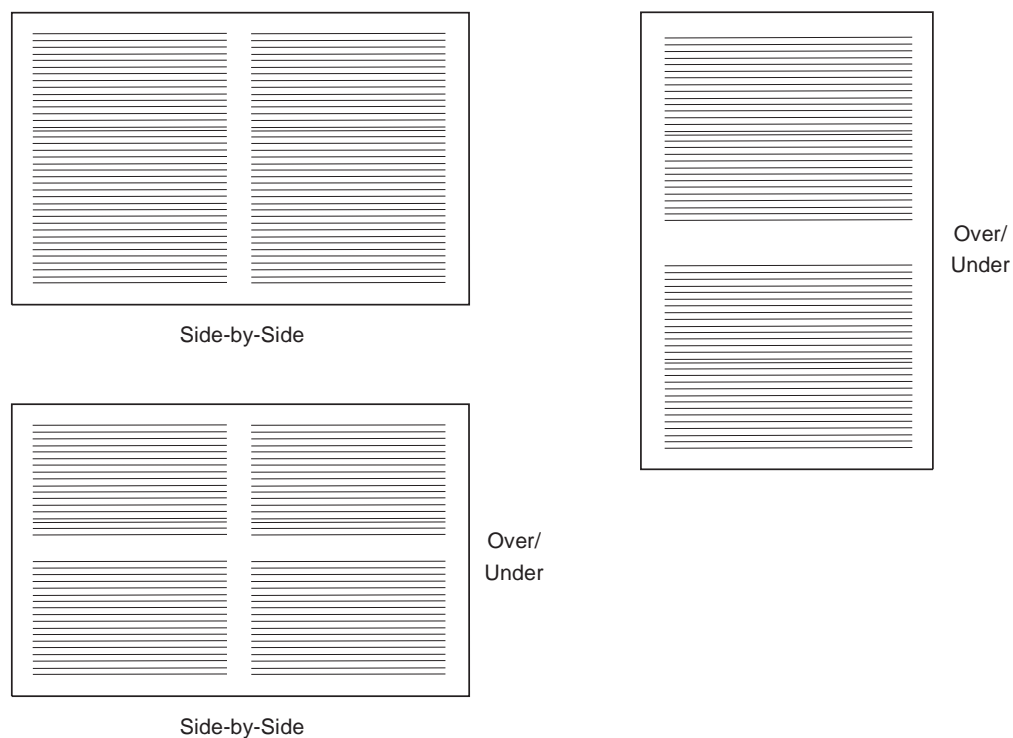


Figure 187. Placement of Multiple-Up Logical Pages on the Physical Pages

Table 21 lists page definitions for printing on a variety of sizes of 3-hole punched paper. The page definitions specify that the printing direction is Up, and they offset printing to accommodate 3-hole punched paper. You must use these page definitions with the form definitions whose names begin with “F1H”.

Table 21. Page Definitions for Printing on 3-hole Punched Paper

Page Definition Name	Printable Area: Width by Height, in Inches	Print Lines Per Page	Page Position: 3 Down/Across	Recommended Font	Printing Direction	Page Presentation
P1B0446B	13.67 × 7.34	44 at 6 lpi	30/0	GT10	Up	Landscape
P1B0608B	13.67 × 7.34	60 at 8.2 lpi	24/0	GT12	Up	Landscape
P1D0556B	14.0 × 8.96	55 at 6.1 lpi	30/0	GT10	Up	Landscape
P1D0748B	14.0 × 8.96	74 at 8.2 lpi	24/0	GT12	Up	Landscape
P1V0436B	10.67 × 7.11	43 at 6.1 lpi	30/0	GT10	Up	Landscape
P1V0588B	10.67 × 7.11	58 at 8.2 lpi	24/0	GT12	Up	Landscape
P1V0608B	10.67 × 7.11	60 at 8.5 lpi	24/224	GT15	Up	Landscape
P1W1168B	10.67 × 7.11	58 at 8.2 lpi 58 at 8.2 lpi	24/0 24/1281	GT15	Up	Landscape
P1W216FB	10.67 × 7.11	54 at 15.2 lpi 54 at 15.2 lpi 54 at 15.2 lpi 54 at 15.2 lpi	16/48 890/48 16/1322 890/1322	GT24	Up	Landscape

Page Definition Line-Spacing Values and Fonts

The following tables list the line-spacing values for some of the PSF/400-supplied page definitions. The tables also list fonts by group according to the lines per inch at which each font is printed.

Table 22 shows the line-spacing values for each of the page definitions for the IPDS Matrix printers.

Table 22. Cross-Reference of Line Spacing and Page Definitions for the IPDS Matrix Printers.

Line Spacing	Page Definition Name
6 lpi	P1J04964 P1J06462 P1L06464
8.01 lpi	P1J06484 P1A08584 P1L08584

Table 23 shows the line-spacing values for each of the page definitions for cut-sheet A4 paper for the PCL4 and PPDS printers.

Table 23. Cross-Reference of Line Spacing and Page Definitions for Cut-Sheet A4 Paper for the PCL4 and PPDS Printers.

Line Spacing	Page Definition Name
6.1 lpi	P1X04763
8.2 lpi	P1Q09182 P1X06483
8.5 lpi	P1X06683

Table 24 shows the line-spacing values for each of the page definitions for cut-sheet B4 paper for the PCL4 and PPDS printers.

Table 24. Cross-Reference of Line Spacing and Page Definitions for Cut-Sheet B4 Paper for the PCL4 and PPDS Printers.

Line Spacing	Page Definition Name
6 lpi	P1T08362
6.1 lpi	P1T05963
8.2 lpi	P1T11382 P1T07983

Table 25 shows the line-spacing values for each of the page definitions for all other printers.

Table 25. Cross-Reference of Line Spacing and Page Definitions for Other Printers

Line Spacing	Page Definition Name
6 lpi	P1D08462 P1B08262 P1B04963 P1A06462 P1B0446B

Table 25. Cross-Reference of Line Spacing and Page Definitions for Other Printers (continued)

Line Spacing	Page Definition Name
6.1 lpi	P1D06063 P1V04863 P1D0556B P1V0436B
8.2 lpi	P1C09182 P1D11382 P1D08083 P1A08682 P1V06483 P1B11082 P1B06683 P1W12883 P1B0608B P1D0748B P1V0588B P1W1168B
8.5 lpi	P1V0608B P1V06683
12 lpi	P1W120C2
15.2 lpi	P1W240F3 P1W216FB

Any font that can be printed at the specified line spacing (or at a larger line-spacing value) can be used with a page definition. Table 26 describes the line spacing for commonly used monospaced fonts provided with PSF/400.

Table 26. Cross-Reference of Line Spacing and Commonly Used PSF/400 Monospaced Fonts

Line Spacing	Fonts
6 lpi	CE10 CE12 CI10 CR10 GB10 GF10 GS10 GT10 LB12 LR12 PB12 PI12 PR10 PR12
8 lpi	GB12 GF12 GF15 GI12 GP12 GS12 GS15 GT12 GT15
10 lpi	GC15

Table 26. Cross-Reference of Line Spacing and Commonly Used PSF/400 Monospaced Fonts (continued)

Line Spacing	Fonts
12 lpi	GFC GSC GUC
Special	AE20 ⁶ GT20 ⁶ GT24 ⁷

For more information about these fonts or about fonts not listed in this table, refer to the font technical references.

6. Fonts AE20 and GT20 are printed at 12.8 lines per inch. Font GT20 is specified in page definition P1M132C1. To print an application using font AE20, you can use PPFA/370 to change the source for P1M132C1 to specify font AE20.

7. Font GT24 is printed at 8.8 lines per inch as defined in page definition P1M13280.

Appendix E. Form Definitions Supplied by PSF/400

This appendix describes the form definitions supplied by IBM with PSF/400.

Form Definitions for PCL4 and PPDS Printers

The following table describes the form definitions supplied with PSF/400 for printing on PCL4 or PPDS printer through PSF/2. These form definitions must be used in combination with page definitions for the PCL4 and PPDS printers. Each of these form definitions specifies:

- One copy
- No overlays
- No offset stacking or copy marking

Table 27. Form Definitions for PCL4 and PPDS Printers

Form Definition Name	Copy Group	Page Position, In Inches	Duplex	Paper Source
F1CP0110	F2CP0110	0.250,0.200	Duplex off	Primary
F1CP0120	F2CP0120	0.250,0.200	Duplex off	Alternate
F1CP0111	F2CP0111	0.250,0.200	Normal duplex	Primary
F1CP0121	F2CP0121	0.250,0.200	Normal duplex	Alternate
F1CP0112	F2CP0112	0.250,0.200	Tumble duplex	Primary
F1CP0122	F2CP0122	0.250,0.200	Tumble duplex	Alternate

Form Definitions for Printers Other than the PCL4 and PPDS Printers

Table 28 describes the form definitions for printers other than the PCL4 and PPDS printers, with the name and a description of each. Note that printing near the edge of the paper on some printers can result in poor print quality in the border area. Some of the form definitions enable you to use the third paper source, if the printer has one. Refer to your printer publications for the limitations on your printer. Each of these form definitions specifies:

- One copy
- No overlays
- No offset stacking or copy marking

Table 28. Form Definitions for All Printers Other than the PCL4 and PPDS Printers

Form Definition Name	Copy Group	Page Position, In Inches	Duplex	Paper Source
F1A10110	F2A10110	0.165, 0.165	Duplex off	Primary
F1A10120	F2A10120	0.165, 0.165	Duplex off	Alternate
F1A10130	F2A10130	0.165, 0.165	Duplex off	Third
F1A10111	F2A10111	0.165, 0.165	Normal duplex	Primary
F1A10121	F2A10121	0.165, 0.165	Normal duplex	Alternate
F1A10131	F2A10131	0.165, 0.165	Normal duplex	Third
F1A10112	F2A10112	0.165, 0.165	Tumble duplex	Primary

Table 28. Form Definitions for All Printers Other than the PCL4 and PPDS Printers (continued)

Form Definition Name	Copy Group	Page Position, In Inches	Duplex	Paper Source
F1A10122	F2A10122	0.165, 0.165	Tumble duplex	Alternate
F1A10132	F2A10132	0.165, 0.165	Tumble duplex	Third
F1A10140	F2A10140	0.165, 0.165	Duplex Off	Fourth
F1A10141	F2A10141	0.165, 0.165	Normal Duplex	Fourth
F1A10142	F2A10142	0.165, 0.165	Tumble Duplex	Fourth

Note: The 3820 lines up B4-size paper differently from other paper because of the B4 paper length. To compensate for this, you can create a form definition with a page position of 0.10, 0.00 inch.

Table 29 lists form definitions that enable you to print envelopes and use the manual input bin on the 4028 printer.

Table 29. Form Definitions for Printing Envelopes on the 4028

Form Definition Name	Copy Group	Page Position, In Inches	Duplex	Paper Source
F1A101E0	F2A101E0	0.165,0.165	Duplex off	Envelope
F1A000E0	F2A000E0	0,0	Duplex off	Envelope
F1A101M0	F2A101M0	0.165,0.165	Duplex off	Manual
F1A000M0	F2A000M0	0,0	Duplex off	Manual

Table 30 lists form definitions that specify a 0,0 offset.

Table 30. Form Definitions with a 0,0 Offset

Form Definition Name	Copy Group	Page Position, In Inches	Duplex	Paper Source
F1A00010	F2A00010	0,0	Duplex off	Primary
F1A00011	F2A00011	0,0	Normal duplex	Primary
F1A00012	F2A00012	0,0	Tumble duplex	Primary
F1A00020	F2A00020	0,0	Duplex off	Alternate
F1A00021	F2A00021	0,0	Normal duplex	Alternate
F1A00022	F2A00022	0,0	Tumble duplex	Alternate
F1A00030	F2A00030	0,0	Duplex off	Third
F1A00031	F2A00031	0,0	Normal duplex	Third
F1A00032	F2A00032	0,0	Tumble duplex	Third
F1A00040	F2A00040	0,0	Duplex Off	Fourth
F1A00041	F2A00041	0,0	Normal Duplex	Fourth
F1A00042	F2A00042	0,0	Tumble Duplex	Fourth

The following table lists form definitions for N_UP 2 printing. These form definitions define two pages on a side. Refer to *Page Printer Formatting Aid/370: User's Guide and Reference* for additional information on creating N_UP form definitions using the N_UP subcommand.

Table 31. Form Definitions for N_UP 2 Printing

Form Definition Name	Copy Group	Page Position, In Inches	Duplex	Paper Source
F1N20010	F1N20010	0,0	Duplex off	Primary
F1N20011	F1N20011	0,0	Normal duplex	Primary
F1N20012	F1N20012	0,0	Tumble duplex	Primary
F1N20110	F1N20110	0.165,0.165	Duplex off	Primary
F1N20111	F1N20111	0.165,0.165	Normal duplex	Primary
F1N20112	F1N20112	0.165,0.165	Tumble duplex	Primary
F1N20130	F1N20130	0.165,0.165	Duplex off	Third
F1N20131	F1N20131	0.165,0.165	Normal duplex	Third
F1N20132	F1N20132	0.165,0.165	Tumble duplex	Third

Table 32 lists form definitions designed for use with 3-hole punched paper. You can use any of these form definitions with any of the 3-hole punched page definitions.

Table 32. Form Definitions for 3-Hole Punched Paper

Form Definition Name	Copy Group	Page Position, In Inches	Duplex	Paper Source
F1H10110	F2H10110	1.000,0.165	Duplex off	Primary
F1H10111	F2H10111	1.000,0.165 0.165,0.165	Normal duplex	Primary
F1H10112	F2H10112	1.000,0.165 1.000,0.165	Tumble duplex	Primary
F1H10120	F2H10120	1.000,0.165	Duplex off	Alternate
F1H10121	F2H10121	1.000,0.165 0.165,0.165	Normal duplex	Alternate
F1H10122	F2H10122	1.000,0.165 1.000,0.165	Tumble duplex	Alternate
F1H10130	F2H10130	1.000,0.165	Duplex off	Third
F1H10131	F2H10131	1.000,0.165 0.165,0.165	Normal duplex	Third
F1H10132	F2H10132	1.000,0.165 1.000,0.165	Tumble duplex	Third
F1H10140	F2H10140	1.000,0.165	Duplex Off	Fourth
F1H10141	F2H10141	1.000,0.165 0.165,0.165	Normal Duplex	Fourth
F1H10142	F2H10142	1.000,0.165 0.000,0.165	Tumble Duplex	Fourth

Compatibility Form Definitions for the 3831, 3835, and 3900 Printers

Table 33 describes compatibility form definitions supplied with PSF/400 for printing on the 3831, 3835, and 3900 printers. Compatibility form definitions enable you to print data formatted for other printers. Use one of the compatibility form definitions when printing data formatted for *landscape* presentation on a cut-sheet printer.

These form definitions specify the following:

- One copy group ⁸
- One copy
- No offset stacking or copy marking
- Primary paper source
- No overlays

Table 33. Compatibility Form Definitions for the 3831, 3835, and 3900 Printers

Form Definition Name	Compatible With	Presentation Mode	Print Direction	Duplex	Page Position, In Inches
F1C10110	Cut-sheet printers	Landscape	Down	Duplex off	0.165, 0.165
F1C10111	Cut-sheet printers	Landscape	Down	Normal duplex	0.165, 0.165
F1C10112	Cut-sheet printers	Landscape	Down	Tumble duplex	0.165, 0.165
F10101PD	3800 printer wide forms	Portrait	Down	Duplex off	0.00, 0.50
F10101LA	3800 printer wide forms	Landscape	Across	Duplex off	0.00, 0.50
F10101PA	3800 printer narrow forms	Portrait	Across	Duplex off	0.00, 0.50
F10101LD	3800 printer narrow forms	Landscape	Down	Duplex off	0.00, 0.50

You can also use these form definitions when printing on the printers for which the data was formatted so that you do not need to change form definitions.

Table 34. N_UP Compatibility Form Definitions for the 3835 and 3900 Printers

Form Definition Name	Compatible With	Presentation Mode	Print Direction	Duplex	Page Position, In Inches	N_UP
F1N201PD	3800 printer wide forms (N_UP of None)	Portrait	Down	Duplex off	0.00, 0.50	2
F1N201LA	3800 printer wide forms (N_UP of None)	Landscape	Across	Duplex off	0.00, 0.50	2
F1N201PA	3800 printer narrow forms (N_UP of None)	Portrait	Across	Duplex off	0.00, 0.50	2
F1N201LD	3800 printer narrow forms (N_UP of None)	Landscape	Down	Duplex off	0.00, 0.50	2

8. The name of the copy group is the same as the name of the form definition, except for the prefix. For example, form definition F10101PA has one copy group named F20101PA.

Table 34. N_UP Compatibility Form Definitions for the 3835 and 3900 Printers (continued)

Form Definition Name	Compatible With	Presentation Mode	Print Direction	Duplex	Page Position, In Inches	N_UP
Note: Use of the above N_UP form definitions on the 3800 will result in PSF/400 issuing messages APS283I or APS284I. The output will be printed appropriately.						

Refer to *Advanced Function Presentation: Printer Information* for more information about when to use each of these form definitions.

Form Definitions for Special Purpose Jobs

The following table describes the form definitions supplied with PSF/400 for special purposes. You can use these form definitions on any AFP printer. Each of these form definitions specifies:

- One copy
- No offset stacking or copy marking
- Primary paper source
- Duplex off
- Nor forms flash

Table 35. Form Definitions for Special Purpose Jobs

Form Definition Name	Copy Group	Page Position, in Inches	Overlay
F1IBM	IBM	0.0, 0.5	O1IBM
F1OGL	OGL/370	0.0, 0.0	none

Form definition F1IBM is provided for installation verification. It prints a supplied overlay that contains the IBM logo.

Form Definitions for use with Finishing Options

PSF/400 supplies two types of form definitions for use with print jobs that use finishing operations:

- Simple form definitions with finishing
- Finishing form definitions for multiple copy groups

Table 36. Simple form definitions with finishing

Form Definition Name	Page Position, In Inches	Duplex	Paper Source	Finishing Operation
F1FC0010	0, 0	Duplex off	Bin 1	Corner staple, top left
F1FC0111	0,0	Normal duplex	Bin 1	Corner staple, top left
F1FC0112	0, 0	Tumble duplex	Bin 1	Corner staple, top left
F1FE0010	0, 0	Duplex off	Bin 1	Edge staple, left
F1FE0020	0, 0	Normal duplex	Bin 1	Edge staple, left
F1FE0012	0, 0	Tumble duplex	Bin 1	Edge staple, left
F1FS0010	0, 0	Duplex off	Bin 1	N-Up 2, saddle stitch
F1FS0011	0, 0	Normal duplex	Bin 1	Enhanced N-Up 2, saddle stitch

Table 36. Simple form definitions with finishing (continued)

Form Definition Name	Page Position, In Inches	Duplex	Paper Source	Finishing Operation
F1FS2031	0, 0	Normal duplex	Bin 3	N-Up 2, saddle stitch
F1FZ0030	0, 0	Duplex off	Bin 3	Enhanced N-Up 2, ZFold
F1FZ2031	0, 0	Normal duplex	Bin 3	N-Up 2, ZFold
F1FEL010	0, 0	Duplex off	Bin 1	2 edge staples, left
F1FER010	0, 0	Duplex off	Bin 1	3 edge staples, right

Table 37. Finishing Form Definitions with Multiple Copy Groups

Form definition name	Copy Group name	Page Position	Duplex	Paper Source	Copy Group Finishing Operation	Paper Size	Print File Finishing
F1FEC010	COVERPAG	0, 0	Off	Bin 7	None	8.5 x 11 in	2 edge staples, left
	DOCPAGES	0, 0	Off	Bin 1	None	8.5 x 11 in	
F1FEZ010	ZFOLDPGS	0, 0	Off	Bin 3	Z-fold	11 x 17 in	2 edge staples, left
	DOCPAGES	0, 0	Off	Bin 1	None	8.5 x 11 in	
F1FZ1021	B02ZDN1R	0, 0	Normal	Bin 2	Z-fold	11 x 17 in	Device default edge staple
	B01INF	0, 0	Normal	Bin 1	None	8.5 x 11 in	
F1FZ2021	B02ZDN2R	0, 0	Normal	Bin 2	Z-fold enhanced N-Up 2	11 x 17 in	Device default edge staple
	B01INF	0, 0	Normal	Bin 1	None	8.5 x 11 in	

Note: You can obtain additional form definitions from:
[ftp.software.ibm.com/printers](ftp://software.ibm.com/printers). The additional form definitions IBM supplies include:

F1FZ0030 Z-fold from Bin 3
F1FS2031 Saddle stitch, 2-up
F1FEC010 Left edge stitch, cover sheet from bin7
F1FEL010 2 left-edge staples
F1FER010 3 right-edge staples
F1FEZ010 Edge stitch with Z-fold sheets from bin 3
F1FZ1021 Z-fold ledger, 1-up landscape
F1FZ2021 Z-fold ledger, 2-up portrait

Appendix F. Data Description Specifications (DDS) Reference

The following is a listing of DDS keywords associated with printer files.

Remember

DDS and its associated keywords can be used only if the SRCFILE parameter contains the name of the file and the SRCMBR parameter contains the name of the member in which the DDS source resides.

The following list contains all the DDS keywords that you can use to help control how your printed output will look. Remember, some DDS keywords can be used only if the target printer supports them.

ALIAS

Alternative Name. Use this field-level keyword to specify an alternative name for a field. When the program is compiled, the alternative name is brought into the program instead of the DDS field name. The high-level language compiler in use determines if the alternative name is used. Refer to the appropriate high-level language reference publication for information about ALIAS support for that language.

BARCODE

Bar Code. Use this field-level keyword to print a field as a user-specified bar code. BARCODE is valid for IPDS printers. (A bar code is a pattern of bars of various widths containing data to be interpreted by a scanning device.)

BLKFOLD

Blank Fold. Use this field-level keyword for named fields that overflow onto subsequent print lines, to cause folding to occur at a blank rather than at the end of a line. If the blank fold keyword is not specified, the line folds at the end of the physical print line.

BOX

Box. Use this record-level keyword to specify the position where a box will be drawn on a page. You can specify the corners of the box and the weight (thickness) of the lines in the box.

CDEFNT

Coded Font. Use this record- or field-level keyword to specify the coded font for printing a named or constant field or fields within a record.

For outline fonts only: The optional point size parameter can be used to further define a numeric font specifying a point size. It is specified as an expression of the form (*POINTSIZ *value*). The valid values for the parameter are 0.1 through 999.9.

CHRID

Character identifier. Use this field-level keyword to specify that a graphic character set and code page other than the device default can be used for this field. This can be important when extended alphabets (characters such as u with an umlaut or c with a cedilla) are to be printed.

CHRSIZ

Character Size. Use this record- or field-level keyword to expand the width and height of a record or field. This applies to SCS double-byte characters and to IPDS and AFP data stream single-byte characters.

CPI

Characters per Inch. This record- or field-level keyword specifies the horizontal printing density for the record format or field you are defining. Use CPI to:

- Darken logos and other printed graphics that you create using the DFNCHR keyword
- Place more data in less space on printed forms
- Fit the appearance of a form to your needs

CVTDTA

Convert Data. This field-level keyword converts character data to hexadecimal data when the field is passed to the printer. You can use the CVTDTA keyword to define:

- Logos or emblems for a letterhead on your forms
- Alternative character sets or symbols (such as a copyright symbol)
- The appearance of a physical form (by adding vertical and horizontal lines that act as boundaries on the form or between positions on an invoice)
- IPDS bar code commands

DATE

Date. Use this field-level keyword to display the current job date.

DFNCHR

Define Character. The DFNCHR keyword enables you to define characters of your own design at the file or record level for the 5224 Printer and 5225 Printer. With this keyword you can specify DFNCHR more than once at the file or record level, or as many as 50 characters each time you specify DFNCHR.

DFT

Default. Use the DFT keyword to specify a constant value for constant (unnamed) fields.

DLTEDT

Delete Edit. Use this field-level keyword to specify that the OS/400 program is to ignore any edit code or edit word keywords specified for the referenced field. If a field description is referred to from a database file, DLTEDT prevents certain information from being referenced.

DRAWER

Drawer. Use this record-level keyword to specify the drawer from which noncontinuous forms will be selected.

DTASTMCMD

Data Stream Command. Use record- or field-level keyword to store a data stream command in a MO:DCA-P NOOP structured field in the data stream of a spooled file. This information can be used to determine how to process a record or field on a particular page of a spooled file. The DTASTMCMD keyword is only valid for printer files that have the device type specified as *AFPDS.

DUPLEX

Duplex. Use this record-level keyword to specify whether output is printed on one or two sides of the paper.

EDTCDE

Edit Code. Use this keyword to edit output-capable numeric fields.

An edit code is a letter or number indicating that editing should be done according to a defined pattern before a field is displayed or printed.

EDTWRD

Edit Word. If you cannot accomplish the desired editing by using the EDTCDE keyword, specify an edit word instead.

An edit word is a user-defined word that specifies the form in which the field values are to print and clarifies the data by inserting characters, such as decimal points, commas, floating- and fixed-currency symbols, and credit balance indicators. Also use it to suppress leading zeros and to provide asterisk fill protection.

ENDPAGE

End Page. Use this record-level keyword to specify that the page should eject. Page ejection occurs after the record format is processed.

FLTFIXDEC

Floating-Point to Fixed Decimal. Use this field-level keyword to print a number in a floating point field in fixed decimal notation.

FLTPCN

Floating-Point Precision. Use this keyword to specify the precision of a floating-point field.

FNTCHRSET

Font Character Set. Use this record- or field-level keyword to specify the font for printing a named or constant field or fields within a record.

For outline fonts only: The optional point size parameter can be used to further define a numeric font specifying a point size. It is specified as an expression of the form (*POINTSIZ *value*). The valid values for the parameter are 0.1 through 999.9.

FONT

Font. Use the FONT keyword to specify the font ID for printing a named or constant field or fields within a record.

The optional point size parameter can be used to further define a numeric font specifying a point size. It is specified as an expression of the form (*POINTSIZ *value*). The valid values for the parameter are 0.1 through 999.9.

FORCE

Force. Use this record-level keyword to force a new sheet of paper to be fed. FORCE is different from ENDPAGE, because with duplex printing, FORCE ejects the sheet of paper (ENDPAGE only ejects the sheet of paper when printing on the back side of the sheet).

FORMDF

Form Definition. Use this keyword to specify the form definition to be used with the current application.

GDF

Graphics Data Format File. Use this record-level keyword to specify the inclusion of a graphic data file at a specific location on a page.

HIGHLIGHT

Highlight. Use this record- or field-level keyword to indicate that a field should be printed in bold letters.

IGCCDEFNT

DBCS Coded Font. Use this record- or field-level keyword to print DBCS data contained in the AFP data stream.

For outline fonts only: The optional point size parameter can be used to further define a numeric font specifying a point size. It is specified as an expression of the form (*POINTSIZ *value*). The valid values for the parameter are 0.1 through 999.9.

INDARA

Indicator Area. Use this keyword to remove option indicators from the buffer (also called the record area) and place them in a 99-byte separate indicator area.

INDTXT

Indicator Text. Use this file-, record-, or field-level keyword to associate descriptive text (indicating intent or use) with a specific indicator. You can specify INDTXT once for each indicator.

INVM MAP

Invoke Medium Map. Use this keyword to invoke a new medium map. The medium map is in a form definition and enables you to select or change print parameters (input drawer, page rotation, and overlays).

You can specify the medium map name as a constant or program-to-system field.

LINE

Line. Use this record-level keyword to position where a line will be drawn on a page. You can specify the weight (thickness) of lines. Only horizontal and vertical lines can be drawn.

LPI

Lines Per Inch. Use this keyword to change lines per inch within a file. If you do not specify LPI for a record, the LPI value is set from the LPI value on the CRTPRTF, CHGPRTF, or OVRPRTF command.

MSGCON

Message Constant. Use this field-level keyword to indicate that the text for a constant field is contained in a message description. If the message description does not exist at DDS compile time, the file is not created. If you change the message description, you must create the file again.

OUTBIN

Outbin. Use this record-level keyword to specify the destination bin of the output on printers that support multiple output bins.

OVERLAY

Overlay. Use this record-level keyword to specify the inclusion of an overlay to be printed at a specific location on a page.

PAGEDFN

Page Definition. Use this keyword to specify the page definition to be used with the current application.

PAGNBR

Page Number. Use this field-level keyword to specify the location of an unnamed, four-digit, zoned decimal field to contain the page number.

PAGRTT

Page Rotation. Use this record-level keyword to specify the degree of rotation of the text with respect to the way the page is loaded into the printer. The PAGRTT keyword is valid only for the 3812, 3816, 3820, 3825, 3827, 3828, 3829, 3831, 3835, 3900, 3912, 3916, 3935, and 4028 Printers. If you do not specify a PAGRTT keyword for a record, the page rotation is set from the value

specified on the Create Printer File (CRTPRTF), Change Printer File (CHGPRTF), or Override Printer File (OVRPRTF) commands.

Note: Overlays and page segments are not rotated with the rest of the page.

PAGSEG

Page Segment. Use this record-level keyword to specify the inclusion of a page segment to be printed at a specific location on a page.

POSITION

Position. Use this field-level keyword to specify the position of a field using the units specified on the unit of measure (UOM) printer file parameter.

PRTQLTY

Print Quality. Use this record- or field-level keyword to vary the print quality within the file.

The PRTQLTY keyword is allowed only on records or fields for which a CHRSIZ or BARCODE keyword applies.

REF

Reference. Use this file-level keyword to specify the name of a file from which field descriptions are to be retrieved.

REFFLD

Referenced Field. Use this field-level keyword when referring to a field under one of these three conditions:

- The name of the referenced field is different from the name in positions 19 through 28.
- The name of the referenced field is the same as the name in positions 19 through 28, but the record format, file, or library of the referenced field is different from that specified with the REF keyword.
- The referenced field occurs in the same DDS source file as the referencing field.

SKIPA

Skip After. Use this file-, record-, or field-level keyword to specify that the printer device skips to a specific line number after it prints one or more lines.

SKIPB

Skip Before. Use this file-, record-, or field-level keyword to specify that the printer device skips to a specific line number before it prints the next line(s).

SPACEA

Use this record- or field-level keyword to specify that the printer device spaces some number of lines after it prints one or more lines.

SPACEB

Space Before. Use this record- or field-level keyword to specify that the printer device is to space some number of lines before it prints the next line or lines.

TEXT

Text. Use this record- or field-level keyword to supply a text description (or comment) for the record format or field.

TIME

Time. This field-level keyword prints the current system time.

TRNSPY

Transparency. This field-level keyword prevents code points you have redefined

(using the DFNCHR keyword) from being interpreted as SCS printer control commands when your program sends an output operation that prints the field you are defining.

TXTRTT

Text Rotation. Use this field-level keyword to specify the rotation of the text on a page.

UNDERLINE

Underline. Use this field-level keyword to specify that the OS/400 program is to underline the field when it is printed.

ZFOLD

Z-fold. Use this record-level keyword to specify that either a ledger- or A3-sized sheet of paper is to have the z-fold operation applied to it.

For more detailed information on how to create and code DDS source files and to find out which printers support which DDS keywords, refer to *AS/400 Data Description Specifications Reference*.

Appendix G. Control Language (CL) Commands Used for Printing Tasks

The Control Language (CL) commands described in the sections below are used while working with printing tasks.

CL Commands Most Frequently Used for Printing Tasks

Among the CL commands most frequently used for printing tasks are the following:

CRTPRTF

Create a printer file.

CHGPRTF

Change a printer file. Changes to a printer file are permanent.

OVRPRTF

Override a printer file. Overrides to a printer file are in effect only for the current session.

Other CL Commands Used for Printing Tasks

Other CL commands used for printing tasks include those used with spooled files and with output queues. These sets of commands are described below.

CL Commands Used with Spooled Files

You can use the following commands to work with spooled files.

WRKSPLF

Work with Spooled Files. Enables you to display or print a list of all spooled files on the system.

WRKSPLFA

Work with Spooled File Attributes. Shows the current attributes of a spooled file.

CHGSPLFA

Change Spooled File Attributes. Enables you to change some attributes of a spooled file, such as the output queue name or the number of copies requested, while the spooled file is on an output queue.

CPYSPLF

Copy Spooled File. Copies a spooled file to a specified database file. The database file may then be used for other applications, such as those using microfiche or data communications.

DLTSPLF

Delete Spooled File. Deletes a spooled file from the output queue.

DSPSPLF

Display Spooled File. Enables you to display data records of a spooled file.

HLDSPLF

Hold Spooled File. Stops the processing of an output file by a printer writer. The next spooled file in line is processed.

RLSSPLF

Release Spooled File. Releases a previously held spooled output file for processing by the printer writer.

SNDNETSPLF

Send Network Spooled Files. Enables you to send spooled files to another system.

CL Commands Used with Output Queues

The following commands may be used to work with output queues.

WRKOUTQ

Work with Output Queue. Shows the overall status of all output queues or the detailed status of a specific output queue.

WRKOUTQD

Work with Output Queue Description. Shows descriptive information for an output queue.

CLROUTQ

Clear Output Queue. Removes all spooled files from an output queue.

CRTOUTQ

Create Output Queue. Creates a new output queue.

DLTOUTQ

Delete Output Queue. Deletes an output queue from the system.

HLDOUTQ

Hold Output Queue. Prevents all spooled files from being processed by the printer writer.

RLSOUTQ

Release Output Queue. Releases a previously held output queue for processing by the printer writer.

CL Commands Used with PSF Configuration Objects

You can use the following commands to work with PSF configuration objects.

CRTPSFCFG

Create a PSF Configuration Object. Creates a PSF configuration object.

DSPPSFCFG

Display a PSF Configuration Object. Displays a PSF configuration object.

DLTPSFCFG

Delete a PSF Configuration Object. Deletes a PSF configuration object.

CHGPSFCFG

Change a PSF Configuration Object. Changes a PSF Configuration Object.

WRKPSFCFG

Work with a PSF Configuration Object. Works with a list of PSF configuration objects from one or more libraries.

CL Commands Used with Font Resources

You can use the following commands to work with PSF configuration objects.

CHGFNTRSC

Change a font resource. Changes a font resource.

CRTFNTRSC

Create a font resource. Creates a font resource.

WRKFNTRSC

Work with a font resource. Enables you to work with all the font resource space objects from the system or user libraries.

DSPFNTRSCA

Display the attributes of a font resource. Shows the attributes of the specified font resource.

DSPCDEFNT

Display a coded font. Displays a coded font from the specified library.

CHGCDEFNT

Change a coded font. Enables you to mark font character set and code page pairs referenced in the coded font as resident in the printer. (often used when dealing with double-byte fonts)

CL Commands Used with Font Tables

You can use the following commands to work with font tables.

CRTFNTTBL

Create a font table. Creates a font mapping table to be used by PSF/400.

DSPFNTTBL

Display a font table. Displays a font table.

DLTFNTTBL

Delete a font table. Deletes the specified font table.

CHGFNTTBL

Change a font table entry. Changes an entry in the specified font table.

ADDFNTTBL

Add a font table entry. Adds an entry in the specified font table.

RMVFNTTBL

Remove a font table entry. Removes an entry in the specified font table.

Appendix H. Printer File Parameters

The following list contains selected printer file parameters.

FILE	Specifies the qualified name by which the printer file being called is known.
DEV	Specifies the name of a printer device description.
DEVTYPE	Specifies the type of data stream created for a printer file. This parameter indicates whether the resulting data stream should be an intelligent printer data stream (IPDS), an SNA character stream (SCS), an ASCII data stream (*USERASCII), an Advanced Function Printing data stream (*AFPDS), line data (*LINE), or mixed data (*AFPDSLIN).
PAGESIZE	Specifies the length and width of the printer forms used by this printer file.
LPI	Specifies the line spacing setting on the printer, in lines per inch, used by this printer file.
UOM	Specifies the unit of measure to be used for various measurements used in printing. Possible values are: <ul style="list-style-type: none">• *INCH (Use inches as the unit of measure.)• *CM (Use centimeters as the unit of measure.)
CPI	Specifies the printer character density, in characters per inch (CPI), used by this printer file.
OVFLW	Specifies the line number where an overflow message is issued.
RPLUNPRT	Specifies (1) whether unprintable characters are replaced and (2) which substitution character (if any) is used.
FIDELITY	Specifies whether the spooled file should continue printing if errors are encountered. Possible values are: *CONTENT If errors are encountered, the spooled file continues to print. *ABSOLUTE If errors are encountered, the spooled file does not print.
CTLCHAR	Specifies whether the printer file supports input with print control characters.
PRTQLTY	Specifies, for the 4214, 4224, 4230, 4234, and 5219 printers, the quality of print produced.
FORMFEED	Specifies, for the 3916, 4028, 4214, 4224, 4230, 5219, and 5553 printers, the form feed attachment used by this printer file.
DRAWER	Specifies the source drawer used when automatic cut sheet feed mode is used.
OUTBIN	Specifies the destination bin of the output on printers that support multiple output bins. Possible values are: *DEV The destination of the output is the default output bin for the printer device.

Output Bin

For printed output, specifies the output bin to be used on the printer device.

Valid values range from 1 through 65535.

FONT	Specifies the font identifier and the point size of the font used with this printer.
CHRID	Specifies the character identifier (graphic character set and code page) for fields identified with the CHRID DDS keyword.
FNTCHRSET	<p>Specifies the font character set and the code page to be used at printing time.</p> <p>The font character set identifier provides the size and style of the character.</p> <p>For outline fonts, you must specify a point size.</p> <p>The code page identifies which characters in a font are available for printing.</p>
CDEFNT	<p>Specifies the coded font to be used at printing time.</p> <p>A coded font is an AFP resource that is made up of a font character set name and a code page name.</p> <p>For outline fonts, you must specify a point size.</p>
PAGRTT	<p>Specifies the degree of text rotation.</p> <p>Note: Overlays and page segments are not rotated with the rest of the page.</p>
PRTTXT	Specifies the printing of a line of text at the bottom of each page.
JUSTIFY	For the 5219 and 3812 SCS only, specifies the printing positions of the characters on a page so the right-hand margin of printing is regular.
DUPLEX	Specifies whether the output is printed on only one or on two sides of the paper.
SPOOL	Specifies whether the output data for the printer file is spooled.
SCHEDULE	Specifies, for spooled files only, when the spooled file is made available to the printer writer program.
IGCDTA	Specifies, for program-described printer files, whether the printer file processes double-byte character set data.
IGCEXNCR	Specifies whether the system processes double-byte character extension characters.
IGCCHRTT	Specifies whether the printer should rotate double-byte characters 90 degrees counterclockwise when printing.
IGCCPI	Specifies the printer character density of double-byte characters, in characters per inch.
IGCSOSI	Specifies how the system prints shift control characters.
IGCCDEFNT	<p>Specifies the font that the system uses to print DBCS data to an IPDS printer. The printer must be configured AFP(*YES).</p> <p>For outline fonts, you must specify a point size.</p>

WAITFILE	Specifies the number of seconds the program waits for allocation of the file resources when the file is opened.
SHARE	Specifies whether the open data path (ODP) for the printer file can be shared with other programs in the same routing step.
LVLCHK	Specifies whether the level identifiers of the record formats in this printer file are checked when the file is opened by the program.
GENLVL	Specifies the severity level of DDS messages that cause file creation to fail.
FOLD	Specifies whether all positions in a record are printed when the record length exceeds the page width (specified by the PAGESIZE parameter).
ALIGN	Specifies whether the page alignment must be verified by the operator before printing is started.
CHLVAL	Specifies a list of channel numbers with their assigned line numbers. Use this parameter only if CTLCHAR(*FCFC) has been specified.
REDUCE	<p>Specifies whether or not to reduce the output when doing multiple up printing. Multiple up printing refers to the Pages Per Side parameter of the printer file. Possible values are:</p> <p>*TEXT Reduce the text output when doing multiple up printing.</p> <p>*NONE Do not reduce the output when doing multiple up printing.</p>
MULTIUP	Specifies how many logical pages of output can be printed on one physical page of paper. The values are 1 through 4. 1 is the default value.
FRONTMGN	Specifies the margin to be used on the front side of a piece of paper.
BACKMGN	Specifies the margin to be used on the back side of a piece of paper.
FRONTOVL	<p>Specifies the overlay to be used on the front side of a piece of paper. Possible values are:</p> <ul style="list-style-type: none"> • *NONE (No overlay is used.) • Qualified overlay-name (The name of the overlay to be used and the library it is in.)
BACKOVL	<p>Specifies the overlay to be used on the back side of a piece of paper. Possible values are:</p> <ul style="list-style-type: none"> • *FRONTOVL (Use the overlay specified for the FRONTOVL parameter.) • *NONE (No overlay is used.) • Qualified overlay-name (The name of the overlay to be used and the library it is in.)
MAXRCDS	Specifies, for spooled output only, the maximum number of records in the spooled file for spooled jobs using this printer file.
FORMDF	Specifies the name of a form definition to be used.
PAGEDFN	Specifies the name of a page definition to be used.

AFPCHARS	Specifies one or more AFP coded fonts to be used with line data and a page definition.
TBLREFCHR	Specifies whether table reference characters are present in the line data.
CORNERSTPL	Specifies the reference corner to be used for a corner stable by devices that support this function.
EDGESTITCH	Specifies where one or more staples are driven into the media along the finishing operation axis by devices that support this function.
SADLSTITCH	Specifies where one or more stapes are driven into the media along the finishing axis by devices that support this function.
FNTRSL	Specifies the resolution PSF/400 uses when printing to a multiple resolution device configured to report multiple resolutions for a spooled file that does not specify the font metrics and resolution for the requested font.
IPDSPASTHR	Specifies whether IPDS spooled files may pass through PSF to the printer.
USRRSCLIBL	Specifies the list of user resource libraries to be used for searching for AFP resources for a spooled file.

Appendix I. AS/400 SEGMENT and OVERLAY Commands

This appendix describes the AS/400 SEGMENT and OVERLAY commands and gives examples of their displays and of corresponding CL command information and RPG and COBOL source programming material. These commands are not available until they are downloaded.

The OVERLAY and SEGMENT commands automate the processing of overlay and page segment resources created on the client. The general process is:

- Create a temporary physical file
- Copy resource from folder to the physical file
- Create the overlay or page segment object
- Print a proof of the resource
- Optionally, use the Client Access/400 Viewer to view the resource

You can download the SEGMENT and OVERLAY commands from the IBM Printers Home Page (<http://www.printers.ibm.com>). Look for the AS/400 Sampler.

SEGMENT Command

The SEGMENT command is composed of the following:

- SEGMENT command
- SEGMENT CL program
- SEG01 RPG program to print the proof
- SEG01 DDS printer file source

The following figure shows the SEGMENT command display:

Create/Print Page Segment (SEGMENT)

Type choices, press Enter.

Folder	resource	
Document Name	sunlogo.psg	Character value
Segment Description	Super Sun Seeds Logo	
Page Segment Name	sunlogo	Character value
Library	sampler	Character value
Display Segment	*YES	*NO, *YES
Output Queue	'*JOB '	Character value
Output Queue Library	'*LIBL'	Character value
Replace Old Segment	*YES	*NO, *YES

Bottom

F3=Exit F4=Prompt F5=Refresh F12=Cancel F13=How to use this display
F24=More keys

Figure 188. Create/Print Page Segment (SEGMENT) Display

Source for the SEGMENT command is as follows:

```
5763PW1 V3R2M0 960917          SEU SOURCE LISTING  03/03/96 17:51:03          1
SOURCE FILE . . . . .    SAMPLER/QCMDSRC
MEMBER . . . . .    SEGMENT
SEQNBR*...+... 1 ...+... 2 ...+... 3 ...+... 4 ...+... 5 ...+... 6 ...+... 7 ...+... 8
100 CMD PROMPT('Create/Print Page Segment')
200          PARM          KWD(FOLDER) TYPE(*CHAR) LEN(13) +
300          PROMPT('Folder')
400          PARM          KWD(DOCNAM) TYPE(*CHAR) LEN(12) MIN(0) +
500          PROMPT('Document Name')
```

```

600          PARM      KWD(DOCTXT) TYPE(*CHAR) LEN(25) MIN(0) +
700              PROMPT('Segment Description')
800          PARM      KWD(SEG) TYPE(*CHAR) LEN(10) MIN(0) +
900              PROMPT('Page Segment Name')
1000         PARM      KWD(LIB) TYPE(*CHAR) LEN(10) +
1100             MIN(0) PROMPT('Library')
1200         PARM      KWD(VIEW) TYPE(*CHAR) LEN(4) RSTD(*YES) +
1300             DFT(*NO) VALUES(*NO *YES) MIN(0) +
1400             PROMPT('Display Segment ')
1500         PARM      KWD(OUTQ) TYPE(*CHAR) LEN(10) +
1600             DFT('*JOB ') MIN(0) +
1700             PROMPT('Output Queue')
1800         PARM      KWD(OUTQLIB) TYPE(*CHAR) LEN(10) +
1900             DFT('*LIBL') MIN(0) PROMPT('Output Queue +
2000             Library')
2100         PARM      KWD(replace) TYPE(*CHAR) LEN(4) RSTD(*YES) +
2200             DFT(*yes) VALUES(*NO *YES) MIN(0) +
2300             PROMPT('Replace Old Segment')
                * * * * E N D   O F   S O U R C E   * * * *

5763PW1 V3R2M0 960917          SEU SOURCE LISTING 03/03/96 17:48:52          1
SOURCE FILE . . . . . SAMPLER/QCLSRC
MEMBER . . . . . SEGMENT
SEQNBR*...+... 1 ...+... 2 ...+... 3 ...+... 4 ...+... 5 ...+... 6 ...+... 7 ...+... 8
100 /* SEGMENT: processes an segment file residing in a folder, */
200 /* executing the following steps: */
300 /* - Create PSGPF work file */
400 /* - Copy segment file from folder to work file (CPYFRMPCD) */
500 /* - Create page segment object (CRTPAGESEG) */
600 /* - Print page segment (SEG01 program) */
700 /* - Optionally, launch CA/400 Viewer and display segment on PC */
800 /* */
900          PGM      PARM(&FOLDER &DOCNAM &DOCTXT &SEG &LIB &VIEW +
1000              &OUTQ &OUTQLIB &REPLACE)
1100 /* Input */
1200          DCL      &FOLDER *CHAR 13
1300          DCL      &DOCNAM *CHAR 12
1400          DCL      &LIB *CHAR 10
1500          DCL      &SEG *CHAR 8
1600          DCL      &DOCTXT *CHAR 25
1700          DCL      &VIEW *CHAR 4
1800          DCL      &OUTQ *CHAR 10
1900          DCL      &OUTQLIB *CHAR 10
2000 /* Work */
2100          DCL      &CMD *CHAR 70
2200          DCL      &SPLNBR *DEC 4 0
2300          DCL      &SPLCHR *CHAR 4
2400          DCL      &WRK *CHAR 10
2500 /* Job */
2600          DCL      &STSMMSG *CHAR 75
2700          DCL      &JOB *CHAR 10
2800          DCL      &USER *CHAR 10
2900          DCL      &NBR *CHAR 6
3000          DCL      &SYS *CHAR 9
3100          DCL      &JOUTQ *CHAR 10
3200          DCL      &JOUTQLIB *CHAR 10
3300 /* */
3400          DCL      &TEXT *CHAR 40
3500          DCL      &REPLACE *CHAR 4
3600 /* */
3700          DCL      &MSGKEY *CHAR 4
3800          DCL      &MSGDTA *CHAR 100
3900          DCL      &MSGID *CHAR 7
4000 /**/
4100 /* General error handling */
4200 /**/
4300          MONMSG    MSGID(CPF0000) EXEC(GOTO CMDLBL(GENERR))
4400 /**/

```

```

4500 /* Retrieve job values for spooled file name */
4600 /**/
4700          RTVJOBA      JOB(&JOB) USER(&USER) NBR(&NBR) OUTQ(&JOUTQ) +
4800                                OUTQLIB(&JOUTQLIB)
4900          RTVNETA      SYSNAME(&SYS)
5000 /**/
5100 CHGVAR      &STSMMSG (&SEG *TCAT ' Segment being processed')
5200          SNDPGMMSG     MSGID(CPF9898) MSGF(QCPFMSG) MSGDTA(&STSMMSG) +
5300                                TOPGMQ(*EXT) MSGTYPE(*STATUS)
5400 /**/
5500 /* Create work file (PSGPF) for page segment copy */
5600 /**/
5700          DLTf          FILE(QTEMP/PSGPF)
5800          MONMSG         MSGID(CPF2105)
5900          CRTPF          FILE(QTEMP/PSGPF) RCDLEN(8192) MBR(*NONE) +
6000                                MAXMBRS(*NOMAX) LVLCHK(*NO)
6100          ADDPFM         FILE(QTEMP/PSGPF) MBR(&SEG)
6200          MONMSG         MSGID(CPF5812 CPF7306)
6300 /**/
6400 /* Copy page segment file from folder to file */
6500 /**/
6600          CPYFRMPCD      FROMFLR(&FOLDER) TOFILE(QTEMP/PSGPF) +
6700                                FROMDOC(&DOCNAM) TOMBR(&SEG) +
6800                                TRNTBL(*NONE) TRNFMT(*NOTEXT)
6900 /* */
7000 CHGVAR      &STSMMSG (&SEG *TCAT ' copied to PSGPF temporary file')
7100          SNDPGMMSG     MSGID(CPF9898) MSGF(QCPFMSG) MSGDTA(&STSMMSG) +
7200                                TOPGMQ(*EXT) MSGTYPE(*STATUS)
7300
7400 /* */
7500          CHKOBJ         OBJ(QSYS/&LIB) OBJTYPE(*LIB)
7600          MONMSG         MSGID(CPF9801) EXEC(GOTO GENERR)
7700          ADDLIB         LIB(&LIB)
7800          MONMSG         MSGID(CPF2103)
7900
8000 /**/
8100 /* Create page segment object */
8200 /**/
8300          CRTPAGSEG      PAGSEG(&LIB/&SEG) FILE(QTEMP/PSGPF) +
8400                                MBR(&SEG) TEXT(&DOCTXT) REPLACE(&REPLACE)
8500
8600          CHGVAR         &STSMMSG (&SEG *TCAT ' CREATED WITH CRTPAGSEG')
8700          SNDPGMMSG     MSGID(CPF9898) MSGF(QCPFMSG) MSGDTA(&STSMMSG) +
8800                                TOPGMQ(*EXT) MSGTYPE(*STATUS)
8900
9000 /**/
9100 /* Print proof of page segment */
9200 /**/
9300          OVRPRTF        FILE(SEG01) DEVTYPE(*AFPD) PAGESIZE(11 8.5 +
9400                                *UOM) OVRFLW(66) FIDELITY(*CONTENT) +
9500                                PAGRTT(0) FRONTVL(*NONE) +
9600                                OUTQ(&OUTQ) USRDTA(&LIB) +
9700                                SPLFNAME(&SEG) SECURE(*YES)
9800 /* PRINT SEGMENT */
9900          CALL           SEG01 (&SEG &LIB &SPLNBR)
10000
10100 CHGVAR      &STSMMSG (&SEG *TCAT ' segment print complete')
10200          SNDPGMMSG     MSGID(CPF9898) MSGF(QCPFMSG) MSGDTA(&STSMMSG) +
10300                                TOPGMQ(*EXT) MSGTYPE(*STATUS)
10400 /* */
10500 /* Launch CA/400 Viewer and display overlay */
10600 /* */
10700 /* Invoke by command: STRPCCMD PCCMD('CWBVIEWR splfid /V:form') */
10800 /* - splfid is: splfname/splfnum/jobname/jobnum/user/system */
10900 /* - ie. CWBVIEWR INVOICE/12/WS1/074178/USER1/MAIN400 /V:LETTER */
11000 /* */
11100          IF             (&VIEW *EQ '*YES')              (DO)

```

```

11200      CHGVAR      VAR(&SPLCHR) VALUE(&SPLNBR)
11300      CHGVAR      &CMD ('CWBVIEWR OVER01/')
11400      CHGVAR      &CMD (&CMD *TCAT &SPLCHR *TCAT '/')
11500      CHGVAR      &CMD (&CMD *TCAT &JOB *TCAT '/')
11600      CHGVAR      &CMD (&CMD *TCAT &NBR *TCAT '/')
11700      CHGVAR      &CMD (&CMD *TCAT &USER *TCAT '/')
11800 /*      CHGVAR      &CMD (&CMD *TCAT &SYS) */
11900      CHGVAR      &CMD (&CMD *TCAT 'S1019640')
12000      CHGVAR      &WRK (' /V:LETTER')
12100      CHGVAR      &CMD (&CMD *TCAT &WRK)
12200      STRPCCMD      PCCMD(&CMD) PAUSE(*NO)
12300      ENDDO
12400
12500 END:      RETURN
12600 /*      */
12700 GENERR:
12800      SNDPGMMMSG      MSGID(CPF9898) MSGF(QCPFMSG) +
12900      MSGDTA('Unexpected error - use PF10 to review detailed +
13000      messages') MSGTYPE(*ESCAPE)
13100 /*      */
13200 ENDJOB:      ENDPGM

```

* * * * * E N D O F S O U R C E * * * * *

```

5763PW1 V3R2M0 960917      SEU SOURCE LISTING 03/03/96 17:47:58      1
SOURCE FILE . . . . . SAMPLER/QRPGSRC
MEMBER . . . . . SEG01
SEQNBR*...+... 1 ...+... 2 ...+... 3 ...+... 4 ...+... 5 ...+... 6 ...+... 7 ...+... 8
100      * SEG01 - prints page segment (called by SEGMENT command). Also
200      * passes the spooled file number (SNO) back to the calling SEGMENT
300      * program for use with the invocation of the external AFP viewer.
400      *
500      FSEG01      0      E      PRINTER
600      F      KINFDS INFO
700      IINFO      DS
800      I      81 82 TYPE
900      I      103 112 SNAME
1000     I      113 122 SLIB
1100     I      B 123 1240SNO
1200     C      *ENTRY      PLIST
1300     C      PARM      SEG      8
1400     C      PARM      LIB      10
1500     C      PARM      SPLNBR 40
1600     C*
1700     C      MOVEVL' '      BLK8      8
1800     C      MOVEVL'Segment:'PROMP1 8
1900     C      MOVEVL'Library:'PROMP2 8
2000     C      WRITEREC1
2100     C      WRITEREC2
2200     C      WRITEREC3
2300     C      Z-ADDSNO      SPLNBR
2400     C      SETON      LR

```

* * * * * E N D O F S O U R C E * * * * *

```

5763PW1 V3R2M0 960917      SEU SOURCE LISTING 03/03/96 17:48:43      1
SOURCE FILE . . . . . SAMPLER/QDDSSRC
MEMBER . . . . . SEG01
SEQNBR*...+... 1 ...+... 2 ...+... 3 ...+... 4 ...+... 5 ...+... 6 ...+... 7 ...+... 8
100      A* SEG01 - Printer file DDS for printing Page Segment
200      A*      (called by SEGMENT command)
300      A*
400      A* Printer File Create or Change Parameters:
500      A* - Printer Device Type (DEVTYPE)      *AFPD5
600      A* - Overflow Line (OVRFLW)      65
700      A*
800      A      R REC1
900      A      PROMP1      8A      POSITION(0.5 0.5)
1000     A      SEG      8A      POSITION(0.5 1.5)
1100     A      PROMP2      8A      POSITION(0.7 0.5)

```

```

1200      A          LIB          10A          POSITION(0.7 1.5)
1300      A          R REC2          PAGSEG(&LIB/&SEG 5 4)
1400      A          LIB          10A  P
1500      A          SEG          8A  P
1600      A          R REC3          ENDPAGE
                                     * * * * E N D   O F   S O U R C E   * * * *

```

OVERLAY Command

The OVERLAY command is composed of the following:

- OVERLAY command
- OVERLAY CL program
- OVER01 RPG program to print the proof
- OVER01 DDS printer file source

The following figure shows the OVERLAY command display:

Create/Print Overlay (OVERLAY)

Type choices, press Enter.

Folder	resource	
Full Document Name	invbac.ovl	Character value
Overlay Description	Terms and Conditions	
Overlay Library	sampler	Character value
Overlay Name	invbac	Character value
Resolution	'*300'	*240, *300
Display Overlay	*YES	*NO, *YES
Output Queue	'*JOB '	Character value
Output Queue Library	'*LIBL'	Character value
Replace Existing Overlay	*YES	*NO, *YES
Record Length	2313	Number

Bottom

F3=Exit F4=Prompt F5=Refresh F12=Cancel F13=How to use this display
F24=More keys

Figure 189. Create/Print Overlay (OVERLAY) Display

Source for the OVERLAY command is as follows:

```

5763PW1 V3R2M0 960917          SEU SOURCE LISTING  03/03/96 17:51:03          1
SOURCE FILE . . . . .  SAMPLER/QCMDSRC
MEMBER . . . . .  OVERLAY
SEQNBR*...+... 1 ...+... 2 ...+... 3 ...+... 4 ...+... 5 ...+... 6 ...+... 7 ...+... 8
100 CMD PROMPT('Create/Print Overlay')
200      PARM          KWD(FOLDER) TYPE(*CHAR) LEN(13) +
300      PROMPT('Folder')
400      PARM          KWD(DOCNAM) TYPE(*CHAR) LEN(12) MIN(0) +
500      PROMPT('Full Document Name')
600      PARM          KWD(DOCTXT) TYPE(*CHAR) LEN(25) MIN(0) +
700      PROMPT('Overlay Description')
800      PARM          KWD(LIB) TYPE(*CHAR) LEN(10) MIN(0) +
900      PROMPT('Overlay Library')
1000     PARM          KWD(OVL) TYPE(*CHAR) LEN(10) +
1100     MIN(0) PROMPT('Overlay Name')
1200     PARM          KWD(RES) TYPE(*CHAR) LEN(4) RSTD(*YES) +
1300     DFT('*300') VALUES('*240' '*300') MIN(0) +
1400     PROMPT('Resolution')
1500     PARM          KWD(VIEW) TYPE(*CHAR) LEN(4) RSTD(*YES) +
1600     DFT(*NO) VALUES(*NO *YES) MIN(0) +
1700     PROMPT('Display Overlay ')
1800     PARM          KWD(OUTQ) TYPE(*CHAR) LEN(10) +
1900     DFT('*JOB ') MIN(0) +
2000     PROMPT('Output Queue')

```

```

2100          PARM      KWD(OUTQLIB) TYPE(*CHAR) LEN(10) +
2200                      DFT('LIBL') MIN(0) PROMPT('Output Queue +
2300                      Library')
2400          PARM      KWD(REPLACE) TYPE(*CHAR) LEN(4) RSTD(*YES) +
2500                      DFT(*YES) VALUES(*NO *YES) MIN(0) +
2600                      PROMPT('Replace Existing Overlay')
2700          PARM      KWD(RECL) TYPE(*DEC) LEN(6) DFT(2313) MIN(0) +
2800                      PROMPT('Record Length')
                      * * * * * E N D   O F   S O U R C E   * * * * *

5763PW1 V3R2M0 960917          SEU SOURCE LISTING 03/03/96 17:48:51          1
SOURCE FILE . . . . . SAMPLER/QCLSRC
MEMBER . . . . . OVERLAY
SEQNBR*...+... 1 ...+... 2 ...+... 3 ...+... 4 ...+... 5 ...+... 6 ...+... 7 ...+... 8
100 /* OVERLAY: processes an overlay file residing in a folder, */
200 /* executing the following steps: */
300 /* - Create OVERLAY work file */
400 /* - Copy overlay file from folder to work file (CPYFRMPCD) */
500 /* - Ensure font libraries are in library list */
600 /* - Create OVERLAY object (CRTOVL) */
700 /* - Print overlay (OVER01 RPG program) */
800 /* - Optionally, launch CA/400 Viewer and display overlay on PC */
900 /* */
1000          PGM PARM(&FOLDER &DOCNAM &DOCTXT &LIB &OVL &RES &VIEW +
1100                      &OUTQ &OUTQLIB &REPLACE &RECL)
1200 /* Input */
1300          DCL      &FOLDER *CHAR 13
1400          DCL      &DOCNAM *CHAR 12
1500          DCL      &DOCTXT *CHAR 25
1600          DCL      &LIB *CHAR 10
1700          DCL      &OVL *CHAR 8
1800          DCL      &RES *CHAR 4
1900          DCL      &RECL *DEC 6
2000          DCL      &VIEW *CHAR 4
2100          DCL      &REPLACE *CHAR 4
2200          DCL      &OUTQ *CHAR 10
2300          DCL      &OUTQLIB *CHAR 10
2400          DCL      &STSMMSG *CHAR 75
2500          DCL      &CMD *CHAR 75
2600          DCL      &WRK *CHAR 10
2700          DCL      &FILEEXT *CHAR 13
2800          DCL      &TEST *CHAR 12
2900          DCL      &FNAME *CHAR 8
3000 /* Job */
3100          DCL      &JOB *CHAR 10
3200          DCL      &USER *CHAR 10
3300          DCL      &NBR *CHAR 6
3400          DCL      &SYS *CHAR 8
3500          DCL      &JOUTQ *CHAR 10
3600          DCL      &JOUTQLIB *CHAR 10
3700          DCL      &SPLNBR *DEC 2 0
3800          DCL      &SPLCHR *CHAR 2
3900 /* General message handling */
4000 /* */
4100          MONMSG     MSGID(CPF0000) EXEC(GOTO CMDLBL(GENERR))
4200 /* */
4300 CHGVAR      &STSMMSG (&OVL *TCAT ' overlay being processed')
4400          SNDPGMMSG  MSGID(CPF9898) MSGF(QCPFMSG) MSGDTA(&STSMMSG) +
4500                      TOPGMQ(*EXT) MSGTYPE(*STATUS)
4600 /* Retrieve job info */
4700 /* */
4800          RTVJOBA    JOB(&JOB) USER(&USER) NBR(&NBR) OUTQ(&JOUTQ) +
4900                      OUTQLIB(&JOUTQLIB)
5000          RTVNETA    SYSNAME(&SYS)
5100 /* Check/Create OVERLAY PF */
5200 /* */
5300          DLTFL      FILE(QTEMP/OVERLAY)
5400          MONMSG     MSGID(CPF2105)

```

```

5500          CRTPF      FILE(QTEMP/OVERLAY) RCDLEN(&RECL) MBR(*NONE) +
5600                      MAXMBRS(*NOMAX) LVLCHK(*NO)
5700          ADDPFM      FILE(QTEMP/OVERLAY) MBR(&OVL)
5800          MONMSG      MSGID(CPF5812 CPF7306)
5900 /* */
6000 /* Copy overlay file from folder to OVERLAY file */
6100 /* */
6200          CPYFRMPCD    FROMFLR(&FOLDER) TOFILE(QTEMP/OVERLAY) +
6300                      FROMDOC(&DOCNAM) TOMBR(&OVL) +
6400                      TRNTBL(*NONE) TRNFM(*NOTEXT)
6500 /* */
6600          IF          (&OUTQ *EQ '*JOB')          (DO)
6700          CHGVAR      &OUTQ &JOUTQ
6800          CHGVAR      &OUTQLIB &JOUTQLIB
6900          ENDDO
7000 /* */
7100 /* Place 240 dpi font libraries in library list */
7200 /* */
7300          IF          (&RES *EQ '*240')          (DO)
7400          ADDLIB      LIB(QFNTCDEPAG)
7500          MONMSG      MSGID(CPF2103 CPF2110)
7600          ADDLIB      LIB(QFNTCF_LA1)
7700          MONMSG      MSGID(CPF2103 CPF2110)
7800          ADDLIB      LIB(QFNTCPL)
7900          MONMSG      MSGID(CPF2103 CPF2110)
8000          ADDLIB      LIB(QFNT240LA1)
8100          MONMSG      MSGID(CPF2103 CPF2110)
8200          RMVLIBLE    LIB(QFNT300CPL)
8300          MONMSG      MSGID(CPF2110 CPF2104)
8400          RMVLIBLE    LIB(QFNT300LA1)
8500          MONMSG      MSGID(CPF2110 CPF2104)
8600          ENDDO
8700 /* */
8800 /* Place 300 dpi font libraries in library list */
8900 /* */
9000          IF          (&RES *EQ '*300')          (DO)
9100          ADDLIB      LIB(QFNTCDEPAG)
9200          MONMSG      MSGID(CPF2103 CPF2110)
9300          ADDLIB      LIB(QFNTCF_LA1)
9400          MONMSG      MSGID(CPF2103 CPF2110)
9500          ADDLIB      LIB(QFNT300CPL)
9600          MONMSG      MSGID(CPF2103 CPF2110)
9700          ADDLIB      LIB(QFNT300LA1)
9800          MONMSG      MSGID(CPF2103 CPF2110)
9900          RMVLIBLE    LIB(QFNTCPL)
10000         MONMSG      MSGID(CPF2110 CPF2104)
10100         RMVLIBLE    LIB(QFNT240LA1)
10200         MONMSG      MSGID(CPF2110 CPF2104)
10300         ENDDO
10400 /* */
10500 /* Create overlay object, using CRTOVL command */
10600 /* */
10700         CRTOVL      OVL(&LIB/&OVL) FILE(QTEMP/OVERLAY) MBR(&OVL) +
10800                     TEXT(&DOCTXT) REPLACE(&REPLACE)
10900 /* */
11000         CHGVAR      &STSMMSG (&OVL *TCAT ' Overlay Created')
11100         SNDPGMMSG     MSGID(CPF9898) MSGF(QCPFMSG) MSGDTA(&STSMMSG) +
11200                     TOPGMQ(*EXT) MSGTYPE(*STATUS)
11300 /* */
11400 /* Override printer file and print overlay */
11500 /* */
11600         OVRPRTF      FILE(OVER01) TOFILE(*FILE) +
11700                     FIDELITY(*CONTENT) +
11800                     OUTQ(&OUTQ) USRDTA(&OVL)
11900 /* */
12000         CALL          OVER01 PARM(&OVL &LIB &SPLNBR)
12100         CHGVAR      &STSMMSG (&OVL *TCAT ' Sent to Out Queue')

```

```

12200          SNDPGMMSG MSGID(CPF9898) MSGF(QCPFMSG) MSGDTA(&STSMMSG) +
12300          TOPGMQ(*EXT) MSGTYPE(*STATUS)
12400 /* */
12500 /* Launch CA/400 Viewer and display overlay */
12600 /* */
12700 /* Invoke by command: STRPCCMD PCCMD('CWBVIEWR splfid /V:form') */
12800 /* - splfid is: splfname/splfnum/jobname/jobnum/user/system */
12900 /* - ie. CWBVIEWR INVOICE/12/WS1/074178/USER1/MAIN400 /V:LETTER */
13000 /* */
13100          IF          (&VIEW *EQ '*YES')          (DO)
13200          CHGVAR      VAR(&SPLCHR) VALUE(&SPLNBR)
13300          CHGVAR      &CMD ('CWBVIEWR OVER01/')
13400          CHGVAR      &CMD (&CMD *TCAT &SPLCHR *TCAT '/')
13500          CHGVAR      &CMD (&CMD *TCAT &JOB *TCAT '/')
13600          CHGVAR      &CMD (&CMD *TCAT &NBR *TCAT '/')
13700          CHGVAR      &CMD (&CMD *TCAT &USER *TCAT '/')
13800 /*          CHGVAR      &CMD (&CMD *TCAT &SYS) */
13900          CHGVAR      &CMD (&CMD *TCAT 'S1019640')
14000          CHGVAR      &WRK (' /V:LETTER')
14100          CHGVAR      &CMD (&CMD *TCAT &WRK)
14200          STRPCCMD    PCCMD(&CMD) PAUSE(*NO)
14300          ENDDO
14400 END:            RETURN
14500 /* */
14600 GENERR:
14700          SNDPGMMSG MSGID(CPF9898) MSGF(QCPFMSG) +
14800          MSGDTA('Unexpected error - use PF10 to review detailed +
14900          messages') MSGTYPE(*ESCAPE)
15000 /* */
15100 ENDJOB:          ENDPGM

```

***** E N D O F S O U R C E *****

```

5763PW1 V3R2M0 960917          SEU SOURCE LISTING 03/03/96 17:47:58      1
SOURCE FILE . . . . . SAMPLER/QRPGSRC
MEMBER . . . . . OVER01
SEQNBR*...+... 1 ...+... 2 ...+... 3 ...+... 4 ...+... 5 ...+... 6 ...+... 7 ...+... 8
100      * OVER01, called by the OVERLAY command, prints a sample of the
200      * overlay that has just be created. It also passes the spooled file
300      * number (SNO) back to the OVERLAY CL program for use with the
400      * invocation of the external AFP viewer.
500      *
600      FOVER01  O   E          PRINTER
700      F          KINFDS INFO
800      IINFO      DS
900      I          81 82 TYPE
1000     I          103 112 SNAME
1100     I          113 122 SLIB
1200     I          B 123 1240SNO
1300     C          *ENTRY  PLIST
1400     C          PARM      OVER   8
1500     C          PARM      LIB    10
1600     C          PARM      SPLNBR 20
1700     C*
1800     C          MOVE1' '      BLK8   8
1900     C          MOVE1'Overlay:'PROMP1 8
2000     C          MOVE1'Library:'PROMP2 8
2100     C          WRITEREC1
2200     C          WRITEREC2
2300     C          WRITEREC3
2400     C          Z-ADD SNO      SPLNBR
2500     C          SETON          LR

```

***** E N D O F S O U R C E *****

```

5763PW1 V3R2M0 960917          SEU SOURCE LISTING 03/03/96 17:48:39      1
SOURCE FILE . . . . . SAMPLER/QDDSSRC
MEMBER . . . . . OVER01
SEQNBR*...+... 1 ...+... 2 ...+... 3 ...+... 4 ...+... 5 ...+... 6 ...+... 7 ...+... 8
100      A* OVER01 - Printer File DDS for OVERLAY command

```



```

200      A*
300      A*   Printer File Create or Change Parameters:
400      A*   - Printer Device Type (DEVTYPE)           *AFPDS
500      A*
600      A           R REC1
700      A           PROMP1           8A           POSITION(0.1 0.1)
800      A           OVER             8A           POSITION(0.1 1.5)
900      A           PROMP2           8A           POSITION(0.1 3.5)
1000     A           LIB              10A          POSITION(0.1 4.9)
1100     A           R REC2
1200     A           LIB              10A  P          OVERLAY(&LIB/&OVER 0 0)
1300     A           OVER             8A  P
1400     A           R REC3
                                ENDPAGE
                                * * * * E N D   O F   S O U R C E   * * * *

```


Appendix J. Font Samples

This appendix presents a sampling of various fonts provided by IBM. Refer to *IBM AFP Fonts: Font Samples* for a more complete description and illustration of fonts provided by IBM.

FONT NAME	Point Size	Character Set
Times New Roman Medium 6pt	6	CON20060
Times New Roman Medium 7pt	7	CON20070
Times New Roman Medium 8pt	8	CON20080
Times New Roman Medium 9pt	9	CON20090
Times New Roman Medium 10pt	10	CON20000
Times New Roman Medium 11pt	11	CON200A0
Times New Roman Medium 12pt	12	CON200B0
Times New Roman Medium 14pt	14	CON200D0
Times New Roman Medium 16pt	16	CON200F0
Times New Roman Medium 18pt	18	CON200H0
Times New Roman Medium 20pt	20	CON200J0
Times New Roman Medium 24pt	24	CON200N0
Times New Roman Medium 30pt	30	CON200T0
Times New Rom Med 36pt	36	CON200Z0

Figure 190. Times New Roman Medium

FONT NAME	Point Size	Character Set
Times New Roman Bold 6pt	6	C0N40060
Times New Roman Bold 7pt	7	C0N40070
Times New Roman Bold 8pt	8	C0N40080
Times New Roman Bold 9pt	9	C0N40090
Times New Roman Bold 10pt	10	C0N40000
Times New Roman Bold 11pt	11	C0N400A0
Times New Roman Bold 12pt	12	C0N400B0
Times New Roman Bold 14pt	14	C0N400D0
Times New Roman Bold 16pt	16	C0N400F0
Times New Roman Bold 18pt	18	C0N400H0
Times New Roman Bold 20pt	20	C0N400J0
Times New Roman Bold 24pt	24	C0N400N0
Times New Roman Bold 30pt	30	C0N400T0
Times New Rom Bold 36pt	36	C0N400Z0

Figure 191. Times New Roman Bold

FONT NAME	Point Size	Character Set
<i>Times New Roman Italic Medium 6pt</i>	6	CON30060
<i>Times New Roman Italic Medium 7pt</i>	7	CON30070
<i>Times New Roman Italic Medium 8pt</i>	8	CON30080
<i>Times New Roman Italic Medium 9pt</i>	9	CON30090
<i>Times New Roman Italic Medium 10pt</i>	10	CON30000
<i>Times New Roman Italic Medium 11pt</i>	11	CON300A0
<i>Times New Roman Italic Medium 12pt</i>	12	CON300B0
<i>Times New Roman Italic Medium 14pt</i>	14	CON300D0
<i>Times New Roman Italic Medium 16pt</i>	16	CON300F0
<i>Times New Roman Italic Medium 18pt</i>	18	CON300H0
<i>Times New Roman Italic Medium 20pt</i>	20	CON300J0
<i>Times New Roman Italic Medium 24pt</i>	24	CON300N0
<i>Times New Roman Italic Med 30pt</i>	30	CON300T0
<i>Times New Rom Itl Med 36pt</i>	36	CON300Z0

Figure 192. Times New Roman Italic Medium

FONT NAME	Point Size	Character Set
<i>Times New Roman Italic Bold 6pt</i>	6	C0N50060
<i>Times New Roman Italic Bold 7pt</i>	7	C0N50070
<i>Times New Roman Italic Bold 8pt</i>	8	C0N50080
<i>Times New Roman Italic Bold 9pt</i>	9	C0N50090
<i>Times New Roman Italic Bold 10pt</i>	10	C0N50000
<i>Times New Roman Italic Bold 11pt</i>	11	C0N500A0
<i>Times New Roman Italic Bold 12pt</i>	12	C0N500B0
<i>Times New Roman Italic Bold 14pt</i>	14	C0N500D0
<i>Times New Roman Italic Bold 16pt</i>	16	C0N500F0
<i>Times New Roman Italic Bold 18pt</i>	18	C0N500H0
<i>Times New Roman Italic Bold 20pt</i>	20	C0N500J0
<i>Times New Roman Italic Bold 24pt</i>	24	C0N500N0
<i>Times New Roman Ital Bold 30pt</i>	30	C0N500T0
<i>Times New Rom Itl Bld 36pt</i>	36	C0N500Z0

Figure 193. Times New Roman Italic Bold

FONT NAME	Point Size	Character Set
Helvetica Roman Medium 6pt	6	C0H20060
Helvetica Roman Medium 7pt	7	C0H20070
Helvetica Roman Medium 8pt	8	C0H20080
Helvetica Roman Medium 9pt	9	C0H20090
Helvetica Roman Medium 10pt	10	C0H20000
Helvetica Roman Medium 11pt	11	C0H200A0
Helvetica Roman Medium 12pt	12	C0H200B0
Helvetica Roman Medium 14pt	14	C0H200D0
Helvetica Roman Medium 16pt	16	C0H200F0
Helvetica Roman Medium 18pt	18	C0H200H0
Helvetica Roman Medium 20pt	20	C0H200J0
Helvetica Roman Medium 24pt	24	C0H200N0
Helvetica Roman Medium 30pt	30	C0H200T0
Helvetica Rom Med 36pt	36	C0H200Z0

Figure 194. Helvetica Roman Medium

FONT NAME	Point Size	Character Set
Helvetica Roman Bold 6pt	6	C0H40060
Helvetica Roman Bold 7pt	7	C0H40070
Helvetica Roman Bold 8pt	8	C0H40080
Helvetica Roman Bold 9pt	9	C0H40090
Helvetica Roman Bold 10pt	10	C0H40000
Helvetica Roman Bold 11pt	11	C0H400A0
Helvetica Roman Bold 12pt	12	C0H400B0
Helvetica Roman Bold 14pt	14	C0H400D0
Helvetica Roman Bold 16pt	16	C0H400F0
Helvetica Roman Bold 18pt	18	C0H400H0
Helvetica Roman Bold 20pt	20	C0H400J0
Helvetica Roman Bold 24pt	24	C0H400N0
Helvetica Roman Bold 30pt	30	C0H400T0
Helvetica Rom Bld 36pt	36	C0H400Z0

Figure 195. Helvetica Roman Bold

FONT NAME	Point Size	Character Set
<i>Helvetica Italic Medium 6pt</i>	6	COH30060
<i>Helvetica Italic Medium 7pt</i>	7	COH30070
<i>Helvetica Italic Medium 8pt</i>	8	COH30080
<i>Helvetica Italic Medium 9pt</i>	9	COH30090
<i>Helvetica Italic Medium 10pt</i>	10	COH30000
<i>Helvetica Italic Medium 11pt</i>	11	COH300A0
<i>Helvetica Italic Medium 12pt</i>	12	COH300B0
<i>Helvetica Italic Medium 14pt</i>	14	COH300D0
<i>Helvetica Italic Medium 16pt</i>	16	COH300F0
<i>Helvetica Italic Medium 18pt</i>	18	COH300H0
<i>Helvetica Italic Medium 20pt</i>	20	COH300J0
<i>Helvetica Italic Medium 24pt</i>	24	COH300N0
<i>Helvetica Italic Medium 30pt</i>	30	COH300T0
<i>Helvetica Italic Med 36pt</i>	36	COH300Z0

Figure 196. Helvetica Italic Medium

FONT NAME	Point Size	Character Set
<i>Helvetica Italic Bold 6pt</i>	6	C0H50060
<i>Helvetica Italic Bold 7pt</i>	7	C0H50070
<i>Helvetica Italic Bold 8pt</i>	8	C0H50080
<i>Helvetica Italic Bold 9pt</i>	9	C0H50090
<i>Helvetica Italic Bold 10pt</i>	10	C0H50000
<i>Helvetica Italic Bold 11pt</i>	11	C0H500A0
<i>Helvetica Italic Bold 12pt</i>	12	C0H500B0
<i>Helvetica Italic Bold 14pt</i>	14	C0H500D0
<i>Helvetica Italic Bold 16pt</i>	16	C0H500F0
<i>Helvetica Italic Bold 18pt</i>	18	C0H500H0
<i>Helvetica Italic Bold 20pt</i>	20	C0H500J0
<i>Helvetica Italic Bold 24pt</i>	24	C0H500N0
<i>Helvetica Italic Bold 30pt</i>	30	C0H500T0
<i>Helvetica Italic Bld 36pt</i>	36	C0H500Z0

Figure 197. Helvetica Italic Bold

FONT NAME	Point Size	Character Set
Courier Roman Medium 7pt	7	C0420070
Courier Roman Medium 8pt	8	C0420080
Courier Roman Medium 10pt	10	C0420000
Courier Roman Medium 12pt	12	C04200B0
Courier Roman Medium 14pt	14	C04200D0
Courier Roman Medium 20pt	20	C04200J0
Courier Roman Bold 7pt	7	C0440070
Courier Roman Bold 8pt	8	C0440080
Courier Roman Bold 10pt	10	C0440000
Courier Roman Bold 12pt	12	C04400B0
Courier Roman Bold 14pt	14	C04400D0
Courier Roman Bold 20pt	20	C04400J0
Courier Italic 7pt	7	C0430070
Courier Italic 8pt	8	C0430080
Courier Italic 10pt	10	C0430000
Courier Italic 12pt	12	C04300B0
Courier Italic 14pt	14	C04300D0
Courier Italic 20pt	20	C04300J0
Courier Italic Bold 7pt	7	C0450070
Courier Italic Bold 8pt	8	C0450080
Courier Italic Bold 10pt	10	C0450000
Courier Italic Bold 12pt	12	C04500B0
Courier Italic Bold 14pt	14	C04500D0
Courier Italic Bold 20pt	20	C04500J0

Figure 198. Courier Font Samples

Appendix K. AFP Fonts for AS/400

This appendix lists the fonts in the AFP Fonts for AS/400 font product. You can order each font family separately.

These fonts are downloadable raster fonts for 240-pel only.

Table 38. AFP Fonts for AS/400

Family	Weight & Posture	Point size	Library Name
Feature # 5051 Sonoran Serif			
Sonoran Serif	Roman, Roman Bold, Italic, Italic Bold	6 through 12, 14, 16, 18, 20, 24, 30, and 36	QFNT01
Feature # 5052 Sonoran Serif Headliner			
Sonoran Serif	Roman, Roman Bold, Italic, Italic Bold	48, 60, 72	QFNT02
Feature # 5053 Sonoran Sans Serif			
Sonoran Sans Serif	Roman, Roman Bold, Italic, Italic Bold	6 through 12, 14, 16, 18, 20, 24, 30, and 36	QFNT03
Feature # 5054 Sonoran Sans Serif Headliner			
Sonoran Sans Serif	Roman, Roman Bold, Italic, Italic Bold	48, 60, 72	QFNT04
Feature # 5055 Sonoran Sans Serif Condensed			
Sonoran Sans Serif	Roman, Roman Bold, Italic, Italic Bold	6 through 12, 14, 16, 18, 20, 24, 30, and 36	QFNT05
Feature # 5056 Sonoran Sans Serif Expanded			
Sonoran Sans Serif	Roman, Roman Bold, Italic, Italic Bold	6 through 12, 14, 16, 18, 20, 24, 30, and 36	QFNT06
Feature # 5057 Monotype Garamond			
Monotype Garamond	Roman, Roman Bold, Italic, Italic Bold	6 through 12, 14, 16, 18, 20, 24, 30, and 36	QFNT07
Feature # 5058 Century Schoolbook			
Century Schoolbook	Roman, Roman Bold, Italic, Italic Bold	6 through 12, 14, 16, 18, 20, 24, 30, and 36	QFNT08
Feature # 5059 Pi and Specials			
Pi Serif, Pi Sans Serif	Roman, Roman Bold	6, 8, 10, 12	QFNT09
Sonoran Display	Roman	20, 26	QFNT09
Sonoran	Roman	4	QFNT09
Feature # 5060 ITC Souvenir			

Table 38. AFP Fonts for AS/400 (continued)

Family	Weight & Posture	Point size	Library Name
ITC Souvenir	Roman, Roman Bold, Italic, Italic Bold	6 through 12, 14, 16, 18, 20, 24, 30, and 36	QFNT10
Feature # 5061 ITC Avant Garde Gothic			
ITC Avant Garde Gothic	Roman, Roman Bold, Italic, Italic Bold	6 through 12, 14, 16, 18, 20, 24, 30, and 36	QFNT11
Feature # 5062 Math and Science			
Math Format	Roman	6 through 12, 14, 16, 18, 20, 22, 24, 30, 32, 36, 40, 44, 48, 54, 60, 72	QFNT12
Math Symbols Serif, Math Symbols Sans Serif	Roman, Roman Bold	6 through 12, 14, 16, 18, 24, 36	QFNT12
Feature # 5063 DATA1			
Math Symbols Serif, Math Symbols Sans Serif	Roman, Roman Bold, Italic	8	QFNT13
Feature # 5064 APL2			
APL2, APL2 Gothic, APL2 Text	Roman, Italic	8, 9, 10	QFNT14
APL2	Roman	5	QFNT14
Feature # 5065 OCR A and OCR B			
OCR A, OCR B	Roman	10	QFNT15

Table 39. AFP DBCS Fonts for AS/400

Family	Weight & Posture	Point size	Library Name
Feature # 5071 Japanese			
Japanese Gothic	Medium, Upright	5,6,7,10,10.5,12,14,18	QFNT61
Japanese Half Size Gothic	Medium, Upright	8,10.5,12,14,18	QFNT61
Japanese Half Size Mincho	Medium, Upright	8,10.5,12,14,16,18	QFNT61
Japanese Half Size Round Gothic	Medium, Upright	10.5,12,14,18	QFNT61
Japanese Mincho	Medium, Upright	5,7,8,10,10.5,12,13,14,16,18	QFNT61
Japanese Round Gothic	Medium, Upright	10.5,12,14,18	QFNT61
Feature # 5072 Korean			
Korean Gothic	Medium, Upright	5,7	QFNT62
Korean Mincho	Medium, Upright	7,9,10.5,12,14,18	QFNT62
Korean Half Size Gothic	Medium, Upright	5,7	QFNT62
Korean Half Size Mincho	Medium, Upright	7,9,10.5,12,14,18	QFNT62
Feature # 5073 Traditional Chinese			
Traditional Chinese Gothic	Medium, Upright	5	QFNT63
Traditional Chinese Ming	Medium, Upright	7,10,12	QFNT63
Feature # 5074 Simplified Chinese			

Table 39. AFP DBCS Fonts for AS/400 (continued)

Family	Weight & Posture	Point size	Library Name
Simplified Chinese Gothic	Medium, Upright	5	QFNT64
Simplified Chinese Song	Medium, Upright	8,10,12	QFNT64
Feature # 5075 Thai			
Thai Italic	Medium, Italic	18	QFNT65
Thai OFFICIAL	Medium, Upright	12,18	QFNT65

Appendix L. Page Definition and Form Definition Source Code for Super Sun Seeds

Page Definition Source Code

The PPFA source code needed to generate the page definition for the line data shown in "Chapter 13. Using Page Definitions and Form Definitions" on page 193 is shown in the following example.

```
5763PW1 V3R2M0 960917                      SEU SOURCE LISTING
SOURCE FILE . . . . . AFPLIB/PPFASRC
MEMBER . . . . . SEEDS
SEQNBR*...+... 1 ...+... 2 ...+... 3 ...+... 4 ...+... 5 ...+... 6 ...+... 7 ..
100 /* * * * * * W H A T   T H I S   I S   * * * * * */
200 /* The following statements, written as PPFA/400 source statements, */
300 /* describe how to process output from a specific application. The */
400 /* application-generated output was used along with a specification */
500 /* of the desired print format to create the following pagedef and */
600 /* formdef. PPFA/400 is required to process these source statements */
700 /* and from them make a pagedef and a formdef object which PSF/400 */
800 /* uses when printing. */
900 /* * * * * * * * * * * * * * * * * * * * * * * * * * * */
1000
1100 /* * * * * * * * * * * * * * * * * * * * * * * * * * * */
1200 /* pagedef Name: SEEDS */
1300 /* Conditional Processing inside this pagedef: */
1400 /* This is a somewhat complicated pagedef since there are actually */
1500 /* three Pageformats within the pagedef. The following describes */
1600 /* how the page formats work together to allow dynamical format */
1700 /* changing based upon the content of the application data: */
1800 /* 10F1 - First and only page of a single-page billing. */
1900 /* This Pageformat is given control initially under the */
2000 /* assumption that the customer's billing is 1 page long */
2100 /* (logic within this Pageformat will switch to the following */
2200 /* 10FMULTI Pageformat if the customer's billing data turns out */
2300 /* to span multiple pages). */
2400 /* 10FMULTI - First & interior pages of a multi-page billing. */
2500 /* This Pageformat is given control from the 10F1 Pageformat */
2600 /* and will continue processing pages until the last/summary page */
2700 /* is reached (at which point logic within this Pageformat will */
2800 /* switch to the following NOFMULTI Pageformat). */
2900 /* NOFMULTI - Last/summary page of a multi-page billing. */
3000 /* One page will be processed, and control will be returned */
3100 /* unconditionally to Pageformat 10F1 for the next billing. */
3200 /* */
3300 /* Flow      Start-> 10F1 ->-+--> 10FMULTI ->-+--> NOFMULTI ->-+ */
3400 /* Summary:      A      |      A      V      | */
3500 /*                |      V      +---<---+      V */
3600 /*                +-----<-+-----<-----<-----+ */
3700 /* * * * * * * * * * * * * * * * * * * * * * * * * * * */
3800
3900 /* * * * * G E N E R A L   S E C T I O N   * * * * * */
4000 /* pagedef Name: SEEDS */
4100 /* Here we specify characteristics of the pagedef */
4200 /* * * * * * * * * * * * * * * * * * * * * * * * * * * */
4300 PAGEDef SEEDS /* PPFA will produce P1SEEDS as output */
4400 REPLACE YES; /* PPFA should replace existing copy */
4500 /* Define font nicknames as follows: */
4600 FONT BOLD CB10; /* Courier Roman Bold 10 Char/Inch */
```

```

4700 FONT ITAL CI12; /* Courier Italic Normal 12 Char/inch */
4800 FONT NORM CR10; /* Courier Roman Normal 10 Char/inch */
4900 SETUNITS 1 IN 1 IN /* This indicates that the default unit */
5000 /* for all measurements is the inch */
5100 LINESP 6 LPI; /* Lines spacing at 6 lines/inch */
5200
5300 /* * * * P A G E F O R M A T 1 0 F 1 * * * * * */
5400 /* 10F1 - This Pageformat lays out billing data to correspond */
5500 /* around the 0110F1 Overlay. This overlay has a customer */
5600 /* account section at the top of the page, followed by room */
5700 /* for up to 26 lines of billing details and 6 lines of a */
5800 /* "Thank You" message. At the bottom of the page is a pay- */
5900 /* ment slip to contain the customer address and "Amount Due". */
6000 /* Processing Logic Note: */
6100 /* Pageformat 10F1 gets control at the beginning since it is */
6200 /* the first Pageformat listed in the pagedef. It also */
6300 /* receives control from Pageformat NOFMULTI if the previous */
6400 /* billing spanned multiple pages. It is always true, then, */
6500 /* that the current data is on a first billing page. During */
6600 /* processing, it will be determined whether this is a single */
6700 /* page bill (in which case control stays in this Pageformat) */
6800 /* or a multiple-page billing (in which case control is passed */
6900 /* to 10FMULTI to reprocess). */
7000 /* * * * * * */
7100 PAGEFORMAT 10F1; /* Name */
7200
7300 /* Customer Address Block - 4 input lines, 4 output lines */
7400 PRINTLINE
7500 CHANNEL 1 /* When an input line has a first col. */
7600 /* (CC) '1' value, this PRINTLINE gets */
7700 /* control - meaning: top of a new page */
7800 POSITION MARGIN 1.8 /* Horiz Pos:Margin; Vert Pos:Down 1.8" */
7900 FONT BOLD /* Customer name in bold print */
8000 REPEAT 4; /* Process 4 input lines this way */
8100
8200 /* Customer account data - 1 input line, 1 output line */
8300 PRINTLINE
8400 POSITION MARGIN 2.9 /* Horiz Pos:Margin; Vert Pos:Down 2.9" */
8500 FONT NORM; /* Normal font to be used here */
8600
8700 /* Shipping information - 1 input line, 1 output line */
8800 PRINTLINE
8900 POSITION MARGIN 3.2 /* Horiz Pos:Margin; Vert Pos:Down:3.2" */
9000 FONT NORM; /* Normal font to be used here */
9100
9200 /* Billing Detail Section - 20 lines of input, 20 lines of output*/
9300 /* Process the first 20 lines of billing details */
9400 PRINTLINE
9500 POSITION MARGIN 3.8 /* Horiz Pos:Margin; Vert Pos: Down 3.8"*/
9600 FONT NORM /* Normal font to be used here */
9700 REPEAT 20; /* Same processing for 20 lines */
9800 FIELD START 1 LENGTH 57; /* This field always printed */
9900 FIELD START 58 LENGTH 22 /* Note: Positioning is assumed by */
10000 /* default to follow previous FIELD */
10100 /* - which in this case is desirable. */
10200 SUPPRESSION PRICES ; /* Copygroup will decide if to print. */
10300
10400 /* These next 6 lines are either 6 more billing lines or 6 lines */
10500 /* of "Thank You" text. - 6 lines of input, 6 lines of output */
10600 /* Process the first 2 lines as if they are Thank You (Italic) */
10700 PRINTLINE

```

```

10800      POSITION MARGIN NEXT /* Horiz Pos:Margin; Vert Pos:continue */
10900      FONT ITAL           /* Italic font to be used here      */
11000      REPEAT 2;           /* Same processing for 2 lines */
11100
11200      /* We must check line 3 to ensure it really is in the Thank You */
11300      /* area and, therefore, a first page of a single-page billing.   */
11400      /* Furthermore, the field we check will indicate which "icon"    */
11500      /* (the little picture of a seed, tree, or fruit) this page      */
11600      /* includes. The inclusion is controlled here by specifying the   */
11700      /* correct Copygroup. Note: The default icon is the seed icon;    */
11800      /* if it is determined to be correct, no switch is necessary.     */
11900      /* If the field has a non-icon value, we are in the middle of     */
12000      /* a valid first page of a multiple-page billing and we must     */
12100      /* immediately switch to the 10FMULTI Pageformat, which will     */
12200      /* reprocess the page correctly.                                   */
12300      PRINTLINE
12400      POSITION MARGIN NEXT /* Horiz Pos:Margin; Vert Pos: continue */
12500      FONT ITAL;         /* Italic font to be used here */
12600
12700      CONDITION GOT010FM /* Check if really first of single-page */
12800                        /* Note: comparisons are case sensitive*/
12900      START 49 LENGTH 5 /* look for... */
13000      WHEN EQ 'seeds' /* Yes, 1 of 1 - although seeds is the */
13100                        /* default icon, we need to check for */
13200                        /* it or OTHERWISE would get control! */
13300      WHEN EQ 'trees' /* Yes, 1 of 1 - bring in trees picture */
13400      BEFORE SUBPAGE COPYGROUP 10F1TREE /* same Pageformat */
13500      WHEN EQ 'fruit' /* Yes, 1 of 1 - bring in fruit picture */
13600      BEFORE SUBPAGE COPYGROUP 10F1FRUI /* same PageFormat */
13700      OTHERWISE /* No, 1 of Multi - switch to 10FMULTI */
13800      BEFORE SUBPAGE COPYGROUP 10FMULTI PAGEFORMAT 10FMULTI;
13900
14000      /* If above conditions did not switch processing to NOFMULTI */
14100      /* (Switching Copygroup does not affect flow of control), then */
14200      /* this page really is the first of a single-page billing, so */
14300      /* continue processing through the end of the page. */
14400      PRINTLINE
14500      POSITION MARGIN NEXT /* Horiz Pos:Margin; Vert Pos: continue */
14600      FONT ITAL           /* Normal font to be used here */
14700      REPEAT 3;           /* 3 remaining "Thank you" lines */
14800
14900      /* "Total Due" line - 1 line of input, 1 line of output */
15000      PRINTLINE
15100      POSITION MARGIN 8.4 /* Horiz Pos:Margin; Vert Pos:Down 8.5" */
15200      FONT NORM;        /* Normal font to be used here */
15300      FIELD START 1 LENGTH 79
15400      SUPPRESSION PRICES ; /* Copygroup will decide if to print. */
15500
15600      /* Date/Total Line - 1 line of input, 1 line of output */
15700      PRINTLINE
15800      POSITION MARGIN 9.17 /* Horiz Pos:Margin; Vert Pos:Down 8.5" */
15900      FONT NORM;          /* Normal font to be used here */
16000      FIELD START 1 LENGTH 60; /* Always print the date */
16100      FIELD START 61 LENGTH 19 /* Total may be suppressed */
16200      SUPPRESSION PRICES ; /* Copygroup will decide if to print. */
16300
16400      /* Footer Billing info - 5 lines of input, 5 lines of output */
16500      PRINTLINE
16600      POSITION MARGIN 9.50 /* Horiz Pos:Margin; Vert Pos:Down 9.33"*/
16700      FONT NORM           /* Normal font to be used here */
16800      REPEAT 5;           /* five lines input file lines output */

```

```

16900
17000 /* * * * P A G E F O R M A T 1 0 F M U L T Y * * * * * */
17100 /* 10FMULTI - This Pageformat lays out billing data to */
17200 /* correspond around the 0110FM Overlay. This overlay has a */
17300 /* customer account section at the top of the page, followed */
17400 /* by room for up to 26 lines of billing details. */
17500 /* Processing Logic Note: */
17600 /* Pageformat 10F1 has already determined the current data to */
17700 /* be the first of a multiple-page billing. Now, this */
17800 /* Pageformat will be used to process data until it determines */
17900 /* the last/summary page has been reached, at which time it */
18000 /* gives control to Pageformat NOFMULTI. */
18100 /* * * * * * */
18200 PAGEFORMAT 10FMULTI; /* Name */
18300
18400 /* Customer Address Block - 4 input lines, 4 output lines */
18500 PRINTLINE
18600 CHANNEL 1 /* When an input line has a first col. */
18700 /* (CC) '1' value, this PRINTLINE gets */
18800 /* control - meaning: top of a new page */
18900 POSITION MARGIN 1.8 /* Horiz Pos:Margin; Vert Pos:Down 1.8" */
19000 FONT BOLD /* Customer name in bold print */
19100 REPEAT 4; /* Process 4 input lines this way */
19200
19300 /* Customer account data - 1 input line, 1 output line */
19400 PRINTLINE
19500 POSITION MARGIN 2.9 /* Horiz Pos:Margin; Vert Pos:Down 2.9" */
19600 FONT NORM; /* Normal font to be used here */
19700
19800 /* Shipping information - 1 input line, 1 output line */
19900 PRINTLINE
20000 POSITION MARGIN 3.2 /* Horiz Pos:Margin; Vert Pos:Down:3.2" */
20100 FONT NORM; /* Normal font to be used here */
20200
20300 /* For the details section, change to 4 LPI to "fill out" area. */
20400 SETUNITS LINESP 4 LPI; /* 4 lines per inch */
20500
20600 /* Billing Detail Section - 26 lines of input, 26 lines of output*/
20700 /* Process the first 22 lines of billing details */
20800 PRINTLINE
20900 POSITION MARGIN 3.8 /* Horiz Pos:Margin; Vert Pos: Down 3.8"*/
21000 FONT NORM /* Normal font to be used here */
21100 REPEAT 22; /* Same processing for 22 lines */
21200 FIELD START 1 LENGTH 57; /* This field always printed */
21300 FIELD START 58 LENGTH 22 /* Note: Positioning is assumed by */
21400 /* default to follow previous FIELD */
21500 /* - which in this case is desirable. */
21600 SUPPRESSION PRICES ; /* Copygroup will decide if to print. */
21700
21800 /* We must check billing detail line 23 for the possibility that */
21900 /* this page is last/summary page. If it is, we switch to the */
22000 /* NOFMULTI Pageformat, which will reprocess the page correctly. */
22100 PRINTLINE
22200 POSITION MARGIN NEXT /* Horiz Pos:Margin; Vert Pos: continue */
22300 FONT NORM; /* Normal font to be used here */
22400 FIELD START 1 LENGTH 57; /* This field always printed */
22500 FIELD START 58 LENGTH 22 /* Note: Positioning is assumed by */
22600 /* default to follow previous FIELD */
22700 /* - which in this case is desirable. */
22800 SUPPRESSION PRICES ; /* Copygroup will decide if to print. */
22900

```

```

23000      CONDITION GOTONOF      /* Check if need to process last/summary*/
23100                                     /* Note: comparisons are case sensitive*/
23200      START 49 LENGTH 5      /* look for... */
23300      WHEN EQ 'seeds'        /* Yes, N of Multi - get seed picture */
23400      BEFORE SUBPAGE COPYGROUP NOFMSEED PAGEFORMAT NOFMULTI
23500      WHEN EQ 'trees'        /* Yes, N of Multi - get tree picture */
23600      BEFORE SUBPAGE COPYGROUP NOFMTREE PAGEFORMAT NOFMULTI
23700      WHEN EQ 'fruit'        /* Yes, N of Multi - get fruit picture*/
23800      BEFORE SUBPAGE COPYGROUP NOFMFRUI PAGEFORMAT NOFMULTI;
23900
24000      /* If above conditions did not switch processing to NOFMULTI, */
24100      /* then this page is still an internal page, so continue on. */
24200      PRINTLINE
24300      POSITION MARGIN NEXT      /* Horiz Pos:Margin; Vert Pos: continue */
24400      FONT NORM                /* Normal font to be used here */
24500      REPEAT 3;                /* Same processing for lines 24-26 */
24600      FIELD START 1 LENGTH 57; /* This field always printed */
24700      FIELD START 58 LENGTH 22 /* Note: Positioning is assumed by */
24800                                /* default to follow previous FIELD */
24900                                /* - which in this case is desirable. */
25000      SUPPRESSION PRICES ; /* Copygroup will decide if to print. */
25100
25200      /* "CONTINUED" line - 1 input line, 1 output line */
25300      PRINTLINE
25400      POSITION MARGIN 10.5      /* Horiz Pos:Margin; Vert Pos:Down 10.5"*/
25500      FONT ITAL;                /* Italic font to be used here */
25600
25700      /* "Page x" line - 1 input line, 1 output line */
25800      PRINTLINE
25900      POSITION MARGIN NEXT      /* Horiz Pos:Margin; Vert Pos: continue */
26000      FONT NORM;                /* Normal font to be used here */
26100
26200      /* * * * P A G E F O R M A T   N O F M U L T I * * * * * */
26300      /* NOFMULTI - This Pageformat lays out billing data to */
26400      /* correspond around the 01NOFM Overlay. This overlay has */
26500      /* one line for a customer name at the top, and a large */
26600      /* payment slip at the bottom to contain customer address and */
26700      /* "Amount Due". In the middle of the page there is room for */
26800      /* up to 26 lines of billing details and 6 lines for a "Thank */
26900      /* You" message. */
27000      /* Processing Logic Note: */
27100      /* Pageformat 10FMULTI has already determined the current data */
27200      /* to be the last of a multiple-page billing. Now, this */
27300      /* Pageformat will process this last page and return control */
27400      /* to Pageformat 10F1 for the next customer's billing. */
27500      /* * * * * * */
27600      PAGEFORMAT NOFMULTI;      /* Name */
27700
27800      SETUNITS LINE SP 6 LPI; /* 6 lines per inch */
27900
28000      /* Customer Address Block - 4 input lines, 1/2 output line */
28100      /* We want to output part of the 1st line, and suppress the */
28200      /* remaining 3 input lines (historically the application needed */
28300      /* to output the information, but it no longer should be printed */
28400      /* (Note: this feature shows how we are protected from changing */
28500      /* (the application) */
28600      PRINTLINE
28700      CHANNEL 1                  /* When an input line has a first col. */
28800                                /* (CC) '1' value, this PRINTLINE gets */
28900                                /* control - meaning: top of a new page */
29000      POSITION MARGIN 1.6;      /* Horiz Pos:Margin; Vert Pos: Down 1.6"*/

```

```

29100      FIELD START 1 LENGTH 44/* Just put out "Sold to" Customer Name */
29200      FONT BOLD;          /* Customer name in bold print      */
29300      /* Before we forget, make a note that after finishing this page */
29400      /* we switch control back to Pageformat 10F1. This condition */
29500      /* has no connection with the above PRINTLINE, it could be */
29600      /* attached to any PRINTLINE in the Pageformat. */
29700      CONDITION GOTO10F1
29800      START 1 LENGTH 1
29900      WHEN GE X'00'          /* Unconditional switch when finished */
30000                                /* Note: seeds icon is made default for */
30100                                /* the next customer billing here. */
30200      AFTER SUBPAGE COPYGROUP 10F1SEED PAGEFORMAT 10F1;
30300
30400
30500      /* Extra address lines - 3 input lines, 0 output lines (suppress)*/
30600      PRINTLINE
30700      POSITION MARGIN SAME     /* Positioning doesn't matter */
30800      REPEAT 3;              /* For three lines */
30900      FIELD TEXT ' ';        /* Just put out blanks instead */
31000
31100      /* Customer account data - 1 input line, 1 output line */
31200      PRINTLINE
31300      POSITION MARGIN 1.9      /* Horiz Pos:Margin; Vert Pos:Down 1.9" */
31400      FONT NORM;             /* Normal font to be used here */
31500
31600      /* Shipping information - 1 input line, 0 output lines (suppress)*/
31700      PRINTLINE
31800      POSITION MARGIN SAME;     /* Positioning doesn't matter */
31900      FIELD TEXT ' ';        /* Just put out blanks instead */
32000
32100      /* Billing Detail Section - 20 lines of input, 20 lines of output*/
32200      /* for the packing list copy. */
32300      PRINTLINE
32400      POSITION MARGIN 2.67     /* Horiz Pos:Margin; Vert Pos: Down 2.67*/
32500      FONT NORM              /* Normal font to be used here */
32600      REPEAT 20;             /* Same processing for 20 lines */
32700      FIELD START 1 LENGTH 57; /* This field always printed */
32800      FIELD START 58 LENGTH 22 /* Note: Positioning is assumed by */
32900                                /* default to follow previous FIELD */
33000                                /* - which in this case is desirable. */
33100      SUPPRESSION PRICES ;    /* Copygroup will decide if to print. */
33200
33300      /* Thank You Section - 6 lines of input, 6 lines of output*/
33400      PRINTLINE
33500      POSITION MARGIN NEXT     /* Horiz Pos:Margin; Vert Pos: continue */
33600      FONT ITAL              /* Italic font to be used here */
33700      REPEAT 6;              /* Same processing for 6 lines */
33800
33900      /* "Total Due" line - 1 line of input, 1 line of output */
34000      PRINTLINE
34100      POSITION MARGIN 8.4      /* Horiz Pos:Margin; Vert Pos:Down 8.4" */
34200      FONT NORM;             /* Normal font to be used here */
34300      FIELD START 1 LENGTH 79
34400      SUPPRESSION PRICES ;    /* Copygroup will decide if to print. */
34500
34600      /* Date/Total Line - 1 line of input, 1 line of output */
34700      PRINTLINE
34800      POSITION MARGIN 9.17     /* Horiz Pos:Margin; Vert Pos:Down 8.5" */
34900      FONT NORM;             /* Normal font to be used here */
35000      FIELD START 1 LENGTH 60; /* Always print the date */
35100      FIELD START 61 LENGTH 19 /* Total may be suppressed */

```

```

35200          SUPPRESSION PRICES ; /* Copygroup will decide if to print.  */
35300
35400          /* Footer Billing info - 5 lines of input, 5 lines of output  */
35500          PRINTLINE
35600          POSITION MARGIN 9.50    /* Horiz Pos:Margin; Vert Pos:Down 9.33"*/
35700          FONT NORM              /* Normal font to be used here      */
35800          REPEAT 5;              /* five lines input five lines output */

```

Form Definition Source Code

The PPFA source code needed to generate the form definition for the line data shown in "Chapter 13. Using Page Definitions and Form Definitions" on page 193 is shown in the following example.

```

35900  /* * * *   G E N E R A L   S E C T I O N   * * * * * */
36000  /*formdef Name: SEEDS                                     */
36100  /* Here we specify characteristics of the formdef         */
36200  /*                                                         */
36300  /* Conditional Logic within the pagedef will switch us between the */
36400  /* different Copygroups. It is necessary to switch Copygroups      */
36500  /* to allow the application data to control if we use a first page  */
36600  /* overlays or a last/summary page overlay. Also, application data */
36700  /* determines which "icon" (seed, tree, or fruit) is to be included */
36800  /* on the summary sheet.                                           */
36900  /* Note: formdefs play no part in the switching logic - they are  */
37000  /* subject to the logical decisions made within the pagedefs.     */
37100  /*                                                         */
37200  /* Multiple output copies and Suppressible field design notes:    */
37300  /* Another requirement of the output is to produce three pages of  */
37400  /* output for each input page, one page for a packing list, one    */
37500  /* page for the customer, and one page for a "File" copy. Moreover, */
37600  /* the prices should be suppressed from the packing list printout,  */
37700  /* and each copy should be uniquely designated "Packing", "Customer" */
37800  /* or "File". Producing multiple copies is the responsibility of  */
37900  /* the formdef alone. For the suppression to work correctly, both  */
38000  /* the pagedef and formdef play a part; the pagedef identifies which */
38100  /* fields are suppressible, and the formdef turns on Suppression as */
38200  /* is necessary.                                                 */
38300  /*                                                         */
38400  /* There need to be seven Copygroups in this formdef (so many are  */
38500  /* needed since there are multiple combinations of icons to be    */
38600  /* merged onto summary-type sheets). There are 3 Copygroups for the */
38700  /* 3 10F1 scenarios (10F1SEED, 10F1TREE, and 10F1FRUI), 1 Copygroup */
38800  /* for the 10FMULTI, and 3 Copygroups for the 3 10FMULTI scenarios */
38900  /* (10FMSEED, 10FMTREE, and 10FMFRUI).                          */
39000  /* * * * * * */
39100  FORMDEF SEEDS          /* PPFA will produce F1SEEDS as output */
39200      REPLACE YES        /* PPFA should replace existing copy */
39300      DUPLEX NORMAL;     /* Print on both sides of the paper */
39400
39500
39600  SUPPRESSION PRICES;    /* Prices will be suppressed on packing */
39700                        /* lists below.                               */
39800
39900  /* * * *   C O P Y   G R O U P   1 0  F 1  S E E D   * * * * * */
40000  /* 10F1SEED - This Copygroup provides the overlay for the      */
40100  /* first page of a single-page billing. Also, it merges in      */
40200  /* the seed icon at a fixed location so that the picture        */

```



```

40300      /* appears next to the "Thank You" message. */
40400      /* * * * * * * * * * * * * * * * * * * * * * * */
40500      COPYGROUP 10F1SEED      /* Name */
40600      CONSTANT BACK;
40700      /* No variable data on back page */
40800      /* You need to "register" overlays to be used in the copygroup */
40900      OVERLAY 10F1;      /* 0110F1 - static design; lines, text */
41000      OVERLAY PACK;      /* 01PACK - overlay for "PACK" copy */
41100      OVERLAY FILE;      /* 01FILE - overlay for "FILE" copy */
41200      OVERLAY CUST;      /* 01CUST - overlay for "Customer" copy*/
41300      OVERLAY TERMS;      /* 01TERMS - Terms and Conditions ovly */
41400      OVERLAY SEED;      /* 01SEED - Seed icon/picture */
41500
41600      /* For each page of application data, 3 duplex pages must be */
41700      /* printed:      Front side      Back side */
41800      /* Page 1      Packing list w/out prices      Terms & Conditions */
41900      /* Page 2      Customer Copy with all data      Terms & Conditions */
42000      /* Page 3      File Copy with all data      Terms & Conditions */
42100      /* ----- Packing List Copy ----- */
42200      SUBGROUP FRONT COPIES 1/* Page 1 FRONT */
42300      SUPPRESSION PRICES /* no prices */
42400      OVERLAY 10F1 PACK /* packlist */
42500      SEED; /* seed icon */
42600      SUBGROUP BACK COPIES 1/* BACK */
42700      OVERLAY TERMS; /* Terms and Conditions */
42800      /* ----- Customer Copy ----- */
42900      SUBGROUP FRONT COPIES 1/* Page 2 FRONT */
43000      OVERLAY 10F1 CUST /* w/prices customer */
43100      SEED; /* seed icon */
43200      SUBGROUP BACK COPIES 1/* BACK */
43300      OVERLAY TERMS; /* Terms and Conditions */
43400      /* ----- "File" Copy ----- */
43500      SUBGROUP FRONT COPIES 1/* Page 3 FRONT */
43600      OVERLAY 10F1 FILE /* w/prices file copy */
43700      SEED; /* seed icon */
43800      SUBGROUP BACK COPIES 1/* BACK */
43900      OVERLAY TERMS; /* Terms and Conditions */
44000
44100      /* * * * C O P Y G R O U P 1 0 F 1 T R E E * * * * * * * */
44200      /* 10F1TREE - This Copygroup provides the overlay for the */
44300      /* first page of a single-page billing. Also, it merges in */
44400      /* the tree icon at a fixed location so that the picture */
44500      /* appears next to the "Thank You" message. */
44600      /* * * * * * * * * * * * * * * * * * * * * * * */
44700      COPYGROUP 10F1TREE      /* Name */
44800      CONSTANT BACK;
44900
45000      /* You need to "register" overlays to be used in the copygroup */
45100      OVERLAY 10F1;      /* 0110F1 - static design; lines, text */
45200      OVERLAY PACK;      /* 01PACK - overlay for "PACK" copy */
45300      OVERLAY FILE;      /* 01FILE - overlay for "FILE" copy */
45400      OVERLAY CUST;      /* 01CUST - overlay for "Customer" copy*/
45500      OVERLAY TERMS;      /* 01TERMS - Terms and Conditions ovly */
45600      OVERLAY TREE;      /* 01TREE - Tree icon/picture */
45700
45800      /* For each page of application data, 3 duplex pages must be */
45900      /* printed:      Front side      Back side */
46000      /* Page 1      Packing list w/out prices      Terms & Conditions */
46100      /* Page 2      Customer Copy with all data      Terms & Conditions */
46200      /* Page 3      File Copy with all data      Terms & Conditions */
46300      /* ----- Packing List Copy ----- */

```



```

46400      SUBGROUP FRONT COPIES 1/* Page 1 FRONT */
46500          SUPPRESSION PRICES /*          no prices */
46600          OVERLAY 10F1 PACK /*          packlist */
46700              TREE; /*          tree icon */
46800      SUBGROUP BACK COPIES 1/*          BACK */
46900          OVERLAY TERMS; /*          Terms and Conditions */
47000              /* ----- Customer Copy ----- */
47100      SUBGROUP FRONT COPIES 1/* Page 2 FRONT */
47200          OVERLAY 10F1 CUST /*          w/prices customer */
47300              TREE; /*          tree icon */
47400      SUBGROUP BACK COPIES 1/*          BACK */
47500          OVERLAY TERMS; /*          Terms and Conditions */
47600              /* ----- "File" Copy ----- */
47700      SUBGROUP FRONT COPIES 1/* Page 3 FRONT */
47800          OVERLAY 10F1 FILE /*          w/prices file copy */
47900              TREE; /*          tree icon */
48000      SUBGROUP BACK COPIES 1/*          BACK */
48100          OVERLAY TERMS; /*          Terms and Conditions */
48200
48300      /* * * * * C O P Y G R O U P   1 0 F 1 F R U I * * * * * */
48400      /* 10F1FRUI - This Copygroup provides the overlay for the */
48500      /* first page of a single-page billing. Also, it merges in */
48600      /* the fruit icon at a fixed location so that the picture */
48700      /* appears next to the "Thank You" message. */
48800      /* * * * * * * * * * * * * * * * * * * * * * * * * * * */
48900      COPYGROUP 10F1FRUI /* Name */
49000      CONSTANT BACK;
49100
49200      /* You need to "register" overlays to be used in the copygroup */
49300      OVERLAY 10F1; /* 0110F1 - static design; lines, text */
49400      OVERLAY PACK; /* 01PACK - overlay for "PACK" copy */
49500      OVERLAY FILE; /* 01FILE - overlay for "FILE" copy */
49600      OVERLAY CUST; /* 01CUST - overlay for "Customer" copy*/
49700      OVERLAY TERMS; /* 01TERMS - Terms and Conditions ovly */
49800      OVERLAY FRUI; /* 01FRUI - Fruit icon/picture */
49900
50000      /* For each page of application data, 3 duplex pages must be */
50100      /* printed: Front side Back side */
50200      /* Page 1 Packing list w/out prices Terms & Conditions */
50300      /* Page 2 Customer Copy with all data Terms & Conditions */
50400      /* Page 3 File Copy with all data Terms & Conditions */
50500              /* ----- Packing List Copy ----- */
50600      SUBGROUP FRONT COPIES 1/* Page 1 FRONT */
50700          SUPPRESSION PRICES /*          no prices */
50800          OVERLAY 10F1 PACK /*          packlist */
50900              FRUI; /*          fruit icon */
51000      SUBGROUP BACK COPIES 1/*          BACK */
51100          OVERLAY TERMS; /*          Terms and Conditions */
51200              /* ----- Customer Copy ----- */
51300      SUBGROUP FRONT COPIES 1/* Page 2 FRONT */
51400          OVERLAY 10F1 CUST /*          w/prices customer */
51500              FRUI; /*          fruit icon */
51600      SUBGROUP BACK COPIES 1/*          BACK */
51700          OVERLAY TERMS; /*          Terms and Conditions */
51800              /* ----- "File" Copy ----- */
51900      SUBGROUP FRONT COPIES 1/* Page 3 FRONT */
52000          OVERLAY 10F1 FILE /*          w/prices file copy */
52100              FRUI; /*          fruit icon */
52200      SUBGROUP BACK COPIES 1/*          BACK */
52300          OVERLAY TERMS; /*          Terms and Conditions */
52400

```

```

52500      /* * * *   C O P Y G R O U P   1 0 F M U L T I * * * * * */
52600      /* 10FMULTI - This Copygroup provides the overlay for the */
52700      /* first & internal pages in a multiple-page billing. */
52800      /* * * * * * * * * * * * * * * * * * * * * * * * * * */
52900      COPYGROUP 10FMULTI      /* Name */
53000      CONSTANT BACK;
53100
53200      OVERLAY 10FM;           /* 0110FM - static design; lines, text */
53300      OVERLAY PACK;           /* 01PACK - overlay for Packing List */
53400      OVERLAY FILE;           /* 01FILE - overlay for "FILE" copy */
53500      OVERLAY CUST;           /* 01CUST - overlay for "Customer" copy*/
53600      OVERLAY TERMS;         /* 01TERMS - Terms and Conditions ovly */
53700
53800      /* For each page of application data, 3 duplex pages must be */
53900      /* printed:      Front side      Back side */
54000      /* Page 1      Packing list w/out prices      Terms & Conditions */
54100      /* Page 2      Customer Copy with all data      Terms & Conditions */
54200      /* Page 3      File Copy with all data      Terms & Conditions */
54300      /* ----- Packing List Copy ----- */
54400      SUBGROUP FRONT COPIES 1/* Page 1 FRONT */
54500      SUPPRESSION PRICES /* no prices */
54600      OVERLAY 10FM PACK; /* packlist */
54700      SUBGROUP BACK COPIES 1/* BACK */
54800      OVERLAY TERMS; /* Terms and Conditions */
54900      /* ----- Customer Copy ----- */
55000      SUBGROUP FRONT COPIES 1/* Page 2 FRONT */
55100      OVERLAY 10FM CUST; /* w/prices customer */
55200      SUBGROUP BACK COPIES 1/* BACK */
55300      OVERLAY TERMS; /* Terms and Conditions */
55400      /* ----- "File" Copy ----- */
55500      SUBGROUP FRONT COPIES 1/* Page 3 FRONT */
55600      OVERLAY 10FM FILE; /* w/prices file copy */
55700      SUBGROUP BACK COPIES 1/* BACK */
55800      OVERLAY TERMS; /* Terms and Conditions */
55900
56000      /* * * *   C O P Y G R O U P   N O F M S E E D * * * * * */
56100      /* NOFMSEED - This Copygroup provides the overlay for the */
56200      /* last page of a multi-page billing. Also, it merges in */
56300      /* the seed icon at a fixed location so that the picture */
56400      /* appears next to the "Thank You" message. */
56500      /* * * * * * * * * * * * * * * * * * * * * * * * * * */
56600      COPYGROUP NOFMSEED      /* Name */
56700      CONSTANT BACK;
56800
56900      /* You need to "register" overlays to be used in the Copygroup */
57000      OVERLAY NOFM;           /* 01NOFM - static design; lines, text */
57100      OVERLAY PACK;           /* 01PACK - overlay for "PACK" copy */
57200      OVERLAY FILE;           /* 01FILE - overlay for "FILE" copy */
57300      OVERLAY CUST;           /* 01CUST - overlay for "Customer" copy*/
57400      OVERLAY TERMS;         /* 01TERMS - Terms and Conditions ovly */
57500      OVERLAY SEED;           /* 01SEED - Seed icon/picture */
57600
57700      /* For each page of application data, 3 duplex pages must be */
57800      /* printed:      Front side      Back side */
57900      /* Page 1      Packing list w/out prices      Terms & Conditions */
58000      /* Page 2      Customer Copy with all data      Terms & Conditions */
58100      /* Page 3      File Copy with all data      Terms & Conditions */
58200      /* ----- Packing List Copy ----- */
58300      SUBGROUP FRONT COPIES 1/* Page 1 FRONT */
58400      SUPPRESSION PRICES /* no prices */
58500      OVERLAY NOFM PACK /* packlist */

```

```

58600          SEED; /* seed icon */
58700 SUBGROUP BACK COPIES 1/* BACK */
58800 OVERLAY TERMS; /* Terms and Conditions */
58900 /* ----- Customer Copy ----- */
59000 SUBGROUP FRONT COPIES 1/* Page 2 FRONT */
59100 OVERLAY NOFM CUST /* w/prices customer */
59200 SEED; /* seed icon */
59300 SUBGROUP BACK COPIES 1/* BACK */
59400 OVERLAY TERMS; /* Terms and Conditions */
59500 /* ----- "File" Copy ----- */
59600 SUBGROUP FRONT COPIES 1/* Page 3 FRONT */
59700 OVERLAY NOFM FILE /* w/prices file copy */
59800 SEED; /* seed icon */
59900 SUBGROUP BACK COPIES 1/* BACK */
60000 OVERLAY TERMS; /* Terms and Conditions */
60100
60200 /* * * * * C O P Y G R O U P   N O F M T R E E * * * * * */
60300 /* NOFMTREE - This Copygroup provides the overlay for the */
60400 /* last page of a multi-page billing. Also, it merges in */
60500 /* the tree icon at a fixed location so that the picture */
60600 /* appears next to the "Thank You" message. */
60700 /* * * * * * */
60800 COPYGROUP NOFMTREE /* Name */
60900 CONSTANT BACK;
61000
61100 /* You need to "register" overlays to be used in the Copygroup */
61200 OVERLAY NOFM; /* 01NOFM - static design; lines, text */
61300 OVERLAY PACK; /* 01PACK - overlay for "PACK" copy */
61400 OVERLAY FILE; /* 01FILE - overlay for "FILE" copy */
61500 OVERLAY CUST; /* 01CUST - overlay for "Customer" copy */
61600 OVERLAY TERMS; /* 01TERMS - Terms and Conditions only */
61700 OVERLAY SEED; /* 01SEED - Seed icon/picture */
61800
61900 /* For each page of application data, 3 duplex pages must be */
62000 /* printed: Front side Back side */
62100 /* Page 1 Packing list w/out prices Terms & Conditions */
62200 /* Page 2 Customer Copy with all data Terms & Conditions */
62300 /* Page 3 File Copy with all data Terms & Conditions */
62400 /* ----- Packing List Copy ----- */
62500 SUBGROUP FRONT COPIES 1/* Page 1 FRONT */
62600 SUPPRESSION PRICES /* no prices */
62700 OVERLAY NOFM PACK /* packlist */
62800 TREE; /* tree icon */
62900 SUBGROUP BACK COPIES 1/* BACK */
63000 OVERLAY TERMS; /* Terms and Conditions */
63100 /* ----- Customer Copy ----- */
63200 SUBGROUP FRONT COPIES 1/* Page 2 FRONT */
63300 OVERLAY NOFM CUST /* w/prices customer */
63400 TREE; /* tree icon */
63500 SUBGROUP BACK COPIES 1/* BACK */
63600 OVERLAY TERMS; /* Terms and Conditions */
63700 /* ----- "File" Copy ----- */
63800 SUBGROUP FRONT COPIES 1/* Page 3 FRONT */
63900 OVERLAY NOFM FILE /* w/prices file copy */
64000 TREE; /* tree icon */
64100 SUBGROUP BACK COPIES 1/* BACK */
64200 OVERLAY TERMS; /* Terms and Conditions */
64300
64400 /* * * * * C O P Y G R O U P   N O F M F R U I * * * * * */
64500 /* NOFMFRUI - This Copygroup provides the overlay for the */
64600 /* last page of a multi-page billing. Also, it merges in */

```

```

64700      /* the fruit icon at a fixed location so that the picture      */
64800      /* appears next to the "Thank You" message.                      */
64900      /* * * * * * * * * * * * * * * * * * * * * * * * * * * * * * */
65000      COPYGROUP NOFMFRUI      /* Name                                */
65100      CONSTANT BACK;
65200
65300      /* You need to "register" overlays to be used in the Copygroup */
65400      OVERLAY NOFM;            /* 01NOFM - static design; lines, text */
65500      OVERLAY PACK;           /* 01PACK - overlay for "PACK" copy    */
65600      OVERLAY FILE;           /* 01FILE - overlay for "FILE" copy    */
65700      OVERLAY CUST;           /* 01CUST - overlay for "Customer" copy*/
65800      OVERLAY TERMS;         /* 01TERMS - Terms and Conditions ovly */
65900      OVERLAY FRUI;          /* 01FRUI - Fruit icon/picture        */
66000
66100      /* For each page of application data, 3 duplex pages must be */
66200      /* printed:      Front side      Back side                      */
66300      /* Page 1      Packing list w/out prices      Terms & Conditions */
66400      /* Page 2      Customer Copy with all data      Terms & Conditions */
66500      /* Page 3      File Copy with all data      Terms & Conditions */
66600      /* ----- Packing List Copy ----- */
66700      SUBGROUP FRONT COPIES 1/* Page 1 FRONT                      */
66800      SUPPRESSION PRICES /* no prices                      */
66900      OVERLAY NOFM PACK /* packlist                      */
67000      FRUI; /* fruit icon */
67100      SUBGROUP BACK COPIES 1/* BACK                      */
67200      OVERLAY TERMS; /* Terms and Conditions */
67300      /* ----- Customer Copy ----- */
67400      SUBGROUP FRONT COPIES 1/* Page 2 FRONT                      */
67500      OVERLAY NOFM CUST /* w/prices customer */
67600      FRUI; /* fruit icon */
67700      SUBGROUP BACK COPIES 1/* BACK                      */
67800      OVERLAY TERMS; /* Terms and Conditions */
67900      /* ----- "File" Copy ----- */
68000      SUBGROUP FRONT COPIES 1/* Page 3 FRONT                      */
68100      OVERLAY NOFM FILE /* w/prices file copy */
68200      FRUI; /* fruit icon */
68300      SUBGROUP BACK COPIES 1/* BACK                      */
68400      OVERLAY TERMS; /* Terms and Conditions */

```

* * * * E N D O F S O U R C E * * * *

Appendix M. Toolbox Source for Super Sun Seeds Case Study

This appendix contains source code for a COBOL program and an RPG program, both using the AFP Toolbox.

Sample COBOL Program using AFP Toolbox

The sample COBOL program shown in this appendix creates the familiar “Super Sun Seeds” application (shown in Figure 199) as it could be implemented with AFP Toolbox function calls.

Overlay

Page Segment

Various Alignments with Typographic Fonts

Variable Size Boxes

Personalized Paragraph

Page Number Count

Bar Code

Qty	UOM	Item #	Item Description	Price	Extension
1000	BX	56413213	Pot Pot	7.65	7,650.00
45	BZ	11005015	Chantenay Seeds	2.19	98.55
900	EA	00001200	Arboles Del Sur	45.00	40,500.00
98	PK	84512023	Oregon Spring Tomato Seed	.97	95.06
4	BX	11057893	African Daisy, Seeds	2.35	9.40
951	CT	11005011	Lasso Red Seeds	892.23	48,510.73
46	DZ	11005014	Scarlet Nantes Seeds	5.90	271.40
100	EA	31321655	Semillas Del Sus Somberos	24.95	2,495.00

Thank You Los Arboles Del Mundo
Because almost half of your order
was Lasso Red Seeds, you will
receive a 10% discount on your
next order.

Page 1 of 1

Total Due \$99,630.14

Return this tear-off strip with your payment.
Payment is due by: 8/28/95

Make Checks Payable to: Super Sun Seeds
Amount Due is: \$99,630.14

Los Arboles Del Mundo
32483 Arbol Lane
Mesa Verde
IL 65478-9390

0001410099630146

Figure 199. Super Sun Seeds Case Study Created with AFP Toolbox

Only portions of the sample program are shown here to illustrate some of the Toolbox functions. A description of the COBOL program listing follows the source code.

Refer to *IBM Advanced Function Presentation Toolbox for Multiple Operating Systems* (S544-5292) for instruction on how to execute the sample programs.

The entire source for this program can be found in library QAOCL/QAYTBSAMPS(CBLTEST) once the Toolbox product is installed. The copy files to declare the AFP variables and PERFORM statements are provided in QAOCL/QAYTBDECLS(AOCLCBLH) and QAOCL/QAYTBDECLS(QAOCLCBLP), respectively.

The sample data is supplied in QAOCL/QAYTBSAMPS(SUNSEEDATA).

```

000100000000 IDENTIFICATION DIVISION.
000200000000 *****
000300000000 * COBOL PROGRAM -- AFP TOOLBOX SUPER SUN SEEDS *
000400000000 *
000500000000 * This program invokes the AFP Toolbox to produce a sample *
000600000000 * customer billing statement. See the "AFP Toolbox AS/400 *
000700000000 * User's Guide" for a picture of the printed output produced *
000800000000 * by this program, and for more information about the Toolbox *
000900000000 * function calls. This sample program is also provided in *
001000000000 * member CBLTEST of the QAOCL/QAYTBSAMPS file. *
001100000000 *
001200000000 *****
001300000000 PROGRAM-ID. SUNSEEDS.
001400000000 ENVIRONMENT DIVISION.
001500000000
001600000000 CONFIGURATION SECTION.
001700000000 SOURCE-COMPUTER. IBM.
001800000000 OBJECT-COMPUTER. IBM.
001900000000
002000000000 INPUT-OUTPUT SECTION.
002100000000 FILE-CONTROL.
002200000000 SELECT INPUT-DATA
002300000000 ASSIGN TO DISK-SUNSEEDATA
002400000000 ORGANIZATION IS SEQUENTIAL
002500000000 FILE STATUS IS FILE-STATUS.
002600000000
002700000000 *****
002800000000 *
002900000000 * DATA DIVISION *
003000000000 *
003100000000 *****
003200000000 DATA DIVISION.
003300000000 FILE SECTION.
003400000000 FD INPUT-DATA
003500000000 RECORD CONTAINS 80 CHARACTERS.
003600000000 01 INPUT-RECORD.
003700000000 03 TRANS-QUANTITY PIC 9(4).
003800000000 03 TRANS-UOM PIC X(2).
003900000000 03 TRANS-ITEMNUM PIC X(8).
004000000000 03 TRANS-DESCRIPTION PIC X(25).
004100000000 03 TRANS-AMOUNT-IN PIC S9(7)V9(2).
004200000000 03 TRANS-CUST-NUM PIC 9(4).
004300000000 03 TRANS-INVOICE-NUM PIC 9(8).
004400000000 03 TRANS-INVOICE-DATE PIC 9(6).
004500000000 03 TRANS-PAYMENT-DATE PIC 9(6).
004600000000 03 TRANS-EXTRA PIC X(8).
004700000000
004800000000 WORKING-STORAGE SECTION.
004900000000
005000000000 01 FILE-STATUS PIC 99.
005100000000 01 CUST-IN.
005200000000 03 CUST-NAME PIC X(25) VALUE SPACES.
005300000000 03 CUST-ST-ADDR PIC X(30) VALUE SPACES.
005400000000 03 CUST-CITY-STATE PIC X(35) VALUE SPACES.
005500000000 03 ACCOUNT-NUM-IN PIC 9(4) VALUE ZERO.
005600000000 03 INVOICE-NUM-IN PIC 9(8) VALUE ZERO.
005700000000 03 INVOICE-DATE-IN PIC 9(6) VALUE ZERO.
005800000000 03 PAYMENT-DATE-IN PIC 9(6) VALUE ZERO.
005900000000 03 SHIP-DATE-IN PIC 9(6) VALUE ZERO.
006000000000 03 TERMS-IN PIC X(4) VALUE SPACES.
006100000000 03 SALESMAN-IN PIC X(25) VALUE SPACES.
006200000000
006300000000 01 TRANSACTION-PROCESSING-VARS.
006400000000 03 PAGE-HEADER-DEPTH PIC 9(5)V9(4) BINARY
006500000000 VALUE 0.0.
006600000000 03 PAGE-BODY PIC 9(5)V9(4) BINARY

```

```

006700000000
006800000000
006900000000
007000000000
007100000000
007200000000
007300000000
007400000000
007500000000
007600000000
007700000000
007800000000
007900000000
008000000000
008100000000
008200000000
008300000000
008400000000
008500000000
008600000000
008700000000
008800000000
008900000000
009000000000
009100000000
009200000000
009300000000
009400000000
009500000000
009600000000
009700000000
009800000000
009900000000
010000000000
010100000000
010200000000
010300000000
010400000000
010500000000
010600000000
010700000000
010800000000
010900000000
011000000000
011100000000
011100000001
011100000002
011200000000
011200000001
011200000002
011200000003
011300000000
011400000000
011500000000
011600000000
011700000000
011800000000
011900000000
012000000000
012100000000
012200000000
012300000000
012400000000
012500000000
012600000000
012700000000
012800000000

03 BOTTOM-MARGIN VALUE 0.0.
03 NUM-CUSTOMER-PAGES PIC 9(5)V9(4) BINARY
VALUE 20.0.
PIC 99 BINARY VALUE 1.

01 CUST-OUT.
03 ACCOUNT-NUM-OUT PIC 9999.
03 INVOICE-NUM-OUT PIC 99999999.
03 OLD-BALANCE-OUT PIC $$$,$$$,$$9.99.
03 MIN-AMOUNT-DUE-OUT PIC $$$,$$$,$$9.99.
03 SHIP-DATE-OUT PIC 99/99/99.
03 INVOICE-DATE-OUT PIC 99/99/99.
03 TRANSACTION-DATE-OUT PIC 99/99/99.
03 TRANS-AMOUNT-OUT PIC $$$,$$9,999.99.
03 EXTENSION-AMOUNT-OUT PIC $$$,$$9,999.99.
03 NUM-CUSTOMER-PAGES-OUT PIC Z9.

01 PROCESSING-SWITCHES.
03 DATA-REMAINS-SWITCH PIC X(3) VALUE "YES".
03 NEW-CUSTOMER PIC X(3) VALUE "NO ".
03 EXTENSION-AMOUNT-COMP PIC 9(7)V99.
03 TOT-AMOUNT-DUE-COMP PIC 9(7)V99.

01 EXCLAMATION PIC X VALUE X"4f".

01 FONT-IDS.
05 TIM10MED PIC 9(4) BINARY VALUE 0.
05 TIM10BOLD PIC 9(4) BINARY VALUE 0.

01 RULE-HANDLES.
03 RULEHNDL1 USAGE IS POINTER.
03 RULEHNDL2 USAGE IS POINTER.
03 RULEHNDL3 USAGE IS POINTER.
03 RULEHNDL4 USAGE IS POINTER.
03 RULEHNDL5 USAGE IS POINTER.
03 RULEHNDL6 USAGE IS POINTER.
03 RULEHNDL7 USAGE IS POINTER.
03 RULEHNDL8 USAGE IS POINTER.

01 AFP-STRING-VARIABLES.
03 AFP-STRING-1 PIC X(10)
VALUE "Thank you ".
03 AFP-STRING-2 PIC X(160)
VALUE "Because almost half your order was Lasso Sun S
- "eeds, you will receive a 10% discount on your next ord
- "er.".

*****
*
* Include the provided copy file that contains
* the AFP Toolbox variables
*
*****
COPY AOCLCLBLH.

/-----*
*****
*
* MAINLINE
*
* This program produces a sample customer statement.*
* The statement contains an overlay with the Super *
* Sun Seeds logo and other fixed data. The *
* customer transactions are formatted into columns *
* of text that are right, left, center, and *
* character-aligned to demonstrate the different *
* Toolbox functions. Variable size boxes are also *
* drawn to create the columns.
*
*

```

```

012900000000
013000000000
013100000000
013200000000
013300000000
013400000000
013500000000
013600000000
013700000000
013800000000
013900000000
014000000000
014100000000
014200000000
014300000000
014400000000
014500000000
014600000000
014700000000
014800000000
014900000000
015000000000
015100000000
015200000000
015300000000
015400000000
015500000000
015600000000
015700000000
015800000000
015900000000
016000000000
016100000000
016200000000
016300000000
016400000000
016500000000
016600000000
016700000000
016800000000
016900000000
017000000000
017100000000
017200000000
017400000000
017600000000
017700960322
017800000000
018000000000
018100000000
018200000000
018300000000
018400000000
018500000000
018600000000
018700000000
018900000000
019100000000
019200000000
019300000000
019400000000
019500000000
019600000000
019700000000
019800000000
019900000000
020000000000

*****
PROCEDURE DIVISION.

MAINLINE.

    OPEN INPUT INPUT-DATA.
    IF FILE-STATUS NOT = ZEROS
        DISPLAY "UNABLE TO OPEN INPUT FILE"
        DISPLAY "FILE STATUS" FILE-STATUS
        STOP RUN.

    PERFORM SETUP-AFPTBOX.
    PERFORM READ-DATA.
    PERFORM PROCESS-A-CUSTOMER UNTIL DATA-REMAINS-SWITCH
        = "NO ".
    PERFORM END-PROCESSING.

    CLOSE INPUT-DATA.
    DISPLAY "SUNSEEDS COMPLETED".
    STOP RUN.

/-----*
*-----*
*
*   SETUP-AFPTBOX.
*       Initialize the session.
*       Begin a document.
*       Define the fonts.
*
*-----*

SETUP-AFPTBOX.
    PERFORM AFPINIT.

*-----*
*
*   Begin the document and specify the output file.
*
*-----*
    MOVE "SUPER SUN SEEDS" TO AFP-DOC-NAME.
    MOVE "AS/400 COBOL Program" TO AFP-DOC-COMMENT.
    MOVE FILED TO AFP-OUTPUT-TYPE.
    MOVE "/QSYS.LIB/QAOCL.LIB/QAYTBRESCLS.FILE/SUNSEEDS.MBR"
        TO AFP-OUTPUT-FILENAME.
    PERFORM AFPBDOC.

*-----*
*
*   Define the fonts.
*
*-----*
    MOVE "T1V10500" TO AFP-CODE-PAGE.
    MOVE "TIMES NEW ROMAN LATIN1" TO AFP-DESCRIPTIVE-NAME.
    MOVE 100 TO AFP-POINT-SIZE.
    MOVE MEDIUM TO AFP-WEIGHT.
    MOVE NORMAL TO AFP-FONT-WIDTH.
    MOVE ROMAN TO AFP-STYLE.
    PERFORM AFPDFNTAT.
    MOVE AFP-FONT-ID TO TIM10MED.
    MOVE BOLD TO AFP-WEIGHT.
    PERFORM AFPDFNTAT.
    MOVE AFP-FONT-ID TO TIM10BOLD.

```



```

020100000000 *-----*
020200000000 *
020300000000 *      READ SAMPLE DATA      *
020400000000 *
020500000000 *-----*
020600000000 READ-DATA.
020700000000 READ INPUT-DATA AT END
020800000000 MOVE "NO" TO DATA-REMAINS-SWITCH
020900000000 END-READ.
021000000000 IF FILE-STATUS NOT = ZEROS AND FILE-STATUS NOT = 10
021100000000 DISPLAY "READ ERROR"
021200000000 DISPLAY "FILE STATUS" FILE-STATUS
021300000000 STOP RUN.
021400000000 *-----*
021500000000 * If this is a new customer, read the customer address and *
021600000000 * account balance. *
021700000000 *-----*
021800000000 IF TRANS-QUANTITY EQUAL ZEROS AND DATA-REMAINS-SWITCH
021900000000 NOT EQUAL "NO"
022000000000 MOVE "YES" TO NEW-CUSTOMER
022100000000 MOVE TRANS-CUST-NUM TO ACCOUNT-NUM-IN
022200000000 MOVE TRANS-INVOICE-NUM TO INVOICE-NUM-IN
022300000000 MOVE TRANS-INVOICE-DATE TO INVOICE-DATE-IN
022400000000 MOVE TRANS-PAYMENT-DATE TO PAYMENT-DATE-IN
022500000000
022600000000 *-----*
022700000000 * Read the customer name *
022800000000 *-----*
022900000000 READ INPUT-DATA AT END MOVE "NO" TO DATA-REMAINS-SWITCH
023000000000 END-READ
023100000000 MOVE TRANS-DESCRIPTION TO CUST-NAME
023200000000
023300000000 *-----*
023400000000 * Read the customer street address. *
023500000000 *-----*
023600000000 READ INPUT-DATA AT END MOVE "NO" TO DATA-REMAINS-SWITCH
023700000000 END-READ
023800000000 MOVE TRANS-DESCRIPTION TO CUST-ST-ADDR
023900000000
024000000000 *-----*
024100000000 * Read the customer city and state. *
024200000000 *-----*
024300000000 READ INPUT-DATA AT END MOVE "NO" TO DATA-REMAINS-SWITCH
024400000000 END-READ
024500000000 MOVE TRANS-DESCRIPTION TO CUST-CITY-STATE
024600000000
024700000000 *-----*
024800000000 * Read the first customer transaction *
024900000000 *-----*
025000000000 READ INPUT-DATA AT END MOVE "NO" TO DATA-REMAINS-SWITCH
025100000000 END-READ
025200000000 IF FILE-STATUS NOT = ZEROS
025300000000 DISPLAY "READ ERROR"
025400000000 DISPLAY "FILE STATUS" FILE-STATUS
025500000000 STOP RUN
025600000000 ELSE CONTINUE
025700000000 END-IF
025800000000 ELSE CONTINUE
025900000000 END-IF.
026000000000 /-----*
026100000000 *-----*
026200000000 *
026300000000 * PROCESS THE CUSTOMER. *
026400000000 *
026500000000 * Begin a page *
026600000000 * Write the page header *
026700000000 * Begin vertical rules *

```

```

026800000000 *          Process the customer transactions          *
026900000000 *          End vertical rules and draw horizontal rule *
027000000000 *          Include 'thank you' notice if room         *
027100000000 *          Write the page footer (tear-off strip)    *
027200000000 *          End the page                                *
027300000000 *-----*
027400000000
027500000000 PROCESS-A-CUSTOMER.
027600000000 *-----*
027700000000 * Initialize the number of transactions for this customer to 0 *
027800000000 *-----*
027900000000 MOVE 1 TO NUM-CUSTOMER-PAGES.
028000000000 MOVE DEFAULT-WS TO AFP-EXTRA-VARS-SPACE.
028100000000 MOVE DEFAULT-ICS TO AFP-EXTRA-ICSPACE.
028200000000
028300000000 MOVE "Page 1" TO AFP-PAGE-NAME.
028500000000 PERFORM AFPBPAGE.
028600000000
028700000000 PERFORM CREATE-THE-HEADER.
028800000000
028900000000 PERFORM PROCESS-TRANSACTIONS.
029000000000
029100000000 PERFORM CREATE-THE-FOOTER.
029200000000
029300000000 PERFORM AFPEPAGE.
029400000000
029500000000 /-----*
029600000000 *-----*
029700000000 *
029800000000 * CREATE THE HEADER. *
029900000000 *
030000000000 *-----*
030100000000
030200000000 CREATE-THE-HEADER.
030300000000 *-----*
030400000000 * INCLUDE THE OVERLAY *
030500000000 *-----*
030600000000 MOVE 0 TO AFP-X-COORDINATE.
030700000000 MOVE ABSOLUTE-POS TO AFP-X-REF-COORD-SYS.
030800000000 MOVE 0 TO AFP-Y-COORDINATE.
030900000000 MOVE ABSOLUTE-POS TO AFP-Y-REF-COORD-SYS.
031000000000 PERFORM AFPSPPOS.
031100000000
031200000000 MOVE "INVHEAD1" TO AFP-OVLY-NAME.
031300000000 PERFORM AFPPIOVL.
031400000000
031500000000 PERFORM PROCESS-THE-ADDRESS.
031600000000
031700000000 *-----*
031800000000 * Start vertical rules under the shaded box *
031900000000 *-----*
032000000000 MOVE 10 TO AFP-RULE-FAT-THICKNESS.
032100000000 MOVE BASELINE-DIR TO AFP-DIRECTION.
032200000000
032300000000 MOVE 793 TO AFP-X-COORDINATE.
032400000000 MOVE ABSOLUTE-POS TO AFP-X-REF-COORD-SYS.
032500000000 MOVE 5442 TO AFP-Y-COORDINATE.
032600000000 MOVE ABSOLUTE-POS TO AFP-Y-REF-COORD-SYS.
032700000000 PERFORM AFPSPPOS.
032800000000 PERFORM AFPBRULE.
032900000000 SET RULEHNDL1 TO AFP-RULE-HANDLE.
033000000000 MOVE 850 TO AFP-X-COORDINATE.
033100000000 PERFORM AFPHMOVE.
033200000000 PERFORM AFPBRULE.
033300000000 SET RULEHNDL2 TO AFP-RULE-HANDLE.
033400000000 MOVE 567 TO AFP-X-COORDINATE.
033500000000 PERFORM AFPHMOVE.

```

033600000000	PERFORM AFPBRULE.
033700000000	SET RULEHNDL3 TO AFP-RULE-HANDLE.
033800000000	MOVE 1474 TO AFP-X-COORDINATE.
033900000000	PERFORM AFPHMOVE.
034000000000	PERFORM AFPBRULE.
034100000000	SET RULEHNDL4 TO AFP-RULE-HANDLE.
034200000000	MOVE 4505 TO AFP-X-COORDINATE.
034300000000	PERFORM AFPHMOVE.
034400000000	PERFORM AFPBRULE.
034500000000	SET RULEHNDL5 TO AFP-RULE-HANDLE.
034600000000	MOVE 1304 TO AFP-X-COORDINATE.
034700000000	PERFORM AFPHMOVE.
034800000000	PERFORM AFPBRULE.
034900000000	SET RULEHNDL6 TO AFP-RULE-HANDLE.
035000000000	MOVE 1500 TO AFP-X-COORDINATE.
035100000000	PERFORM AFPHMOVE.
035200000000	PERFORM AFPBRULE.
035300000000	SET RULEHNDL7 TO AFP-RULE-HANDLE.
035400000000	
035500000000	*-----*
035600000000	* Set font for transaction text *
035700000000	*-----*
035800000000	MOVE AFP-FONT-ID TO TIM10MED.
035900000000	PERFORM AFPSFONT.
036000000000	
036100000000	*-----*
036200000000	* Move down for first transaction *
036300000000	*-----*
036400000000	MOVE 0 TO AFP-X-COORDINATE.
036500000000	PERFORM AFPHMOVETO.
036600000000	PERFORM AFPNLINE.
036700000000	
036800000000	*-----*
036900000000	* Query the position and calculate the page header depth. *
037000000000	*-----*
037100000000	PERFORM AFPQUERY.
037200000000	MOVE AFP-Y-COORDINATE TO PAGE-HEADER-DEPTH.
037300000000	
037400000000	*-----*
037500000000	* Write the account number and invoice number *
037600000000	*-----*
037700000000	MOVE TIM10MED TO AFP-FONT-ID.
037800000000	PERFORM AFPSFONT.
037900000000	
038000000000	MOVE 2254 TO AFP-X-COORDINATE.
038100000000	MOVE ABSOLUTE-POS TO AFP-X-REF-COORD-SYS.
038200000000	MOVE 4335 TO AFP-Y-COORDINATE.
038300000000	MOVE ABSOLUTE-POS TO AFP-Y-REF-COORD-SYS.
038400000000	PERFORM AFPSPOS.
038500000000	
038600000000	MOVE ACCOUNT-NUM-IN TO ACCOUNT-NUM-OUT.
038700000000	MOVE 4 TO AFP-STRING-LENGTH.
038800000000	MOVE ACCOUNT-NUM-OUT TO AFP-CHARACTER-STRING.
039000000000	MOVE RIGHT-ALIGN TO AFP-ALIGNMENT-OPTION.
039100000000	MOVE FALS TO AFP-POSITION-OPTION.
039200000000	PERFORM AFPWRITE.
039300000000	
039400000000	MOVE 3121 TO AFP-X-COORDINATE.
039500000000	PERFORM AFPHMOVE.
039600000000	
039700000000	MOVE INVOICE-NUM-IN TO INVOICE-NUM-OUT.
039800000000	MOVE 8 TO AFP-STRING-LENGTH.
039900000000	MOVE INVOICE-NUM-OUT TO AFP-CHARACTER-STRING.
040100000000	MOVE RIGHT-ALIGN TO AFP-ALIGNMENT-OPTION.
040200000000	MOVE TRU TO AFP-POSITION-OPTION.
040300000000	PERFORM AFPWRITE.
040400000000	

```

040500000000 *-----*
040600000000 * Write the invoice date and payment date *
040700000000 *-----*
040800000000
040900000000
041000000000
041100000000
041200000000
041300000000
041400000000
041600000000
041700000000
041800000000
041900000000
042000000000
042100000000
042200000000
042300000000
042500000000
042600000000
042700000000
042800000000
042900000000
043000000000
043100000000
043200000000
043300000000
043400000000
043500000000
043600000000
043700000000
043800000000
043900000000
044000000000
044100000000
044300000000
044400000000
044500000000
044600000000
044700000000
044800000000
044900000000
045000000000
045100000000
045200000000
045300000000
045600000000
045700000000
045800000000
045900000000
046000000000
046100000000
046200000000
046300000000
046400000000
046500000000
046600000000
046700000000
046800000000
046900000000
047000000000
047100000000
047200000000
047300000000
047400000000
047500000000
047600000000

*-----*
* Write the invoice date and payment date *
*-----*

    MOVE 2551 TO AFP-X-COORDINATE.
    PERFORM AFPHMOVE.

    MOVE INVOICE-DATE-IN TO INVOICE-DATE-OUT.
    MOVE INVOICE-DATE-OUT TO AFP-CHARACTER-STRING.
    MOVE 8 TO AFP-STRING-LENGTH.
    PERFORM AFPWRITE.

    MOVE 2100 TO AFP-X-COORDINATE.
    PERFORM AFPHMOVE.

    MOVE PAYMENT-DATE-IN TO SHIP-DATE-OUT.
    MOVE SHIP-DATE-OUT TO AFP-CHARACTER-STRING.
    MOVE 8 TO AFP-STRING-LENGTH.
    PERFORM AFPWRITE.

*-----*
* Write the shipping information. *
*-----*

*-----*
* Write the terms and sale info. *
*-----*

    PERFORM AFPNLINE.
    MOVE 2800 TO AFP-X-COORDINATE.
    PERFORM AFPHMOVETO.

    MOVE TERMS-IN TO AFP-CHARACTER-STRING.
    MOVE 3 TO AFP-STRING-LENGTH.
    MOVE LEFT-ALIGN TO AFP-ALIGNMENT-OPTION.
    PERFORM AFPWRITE.

    MOVE 2800 TO AFP-X-COORDINATE.
    PERFORM AFPHMOVE.

    CALL "TRIM" USING SALESMAN-IN,
                        BY CONTENT LENGTH OF SALESMAN-IN,
                        BY REFERENCE AFP-CHARACTER-STRING,
                        AFP-STRING-LENGTH.
    ADD 1 TO AFP-STRING-LENGTH.
    MOVE LEFT-ALIGN TO AFP-ALIGNMENT-OPTION.
    PERFORM AFPWRITE.

/-----*
*-----*
*
* PROCESS THE ADDRESS.
*
*-----*

    PROCESS-THE-ADDRESS.

*-----*
* Create the postal zip code. *
*-----*

    MOVE TIM10BOLD TO AFP-FONT-ID.
    PERFORM AFPSFONT.

    MOVE 1450 TO AFP-X-COORDINATE.
    MOVE ABSOLUTE-POS TO AFP-X-REF-COORD-SYS.
    MOVE 2584 TO AFP-Y-COORDINATE.

```

```

047700000000      MOVE ABSOLUTE-POS TO AFP-Y-REF-COORD-SYS.
047800000000      PERFORM AFPSPOS.
047900000000
048000000000      *-----*
048100000000      * Write the customer name.                                *
048200000000      *-----*
048300000000
048400000000      PERFORM AFPNLINE.
048500000000      CALL "TRIM" USING CUST-NAME,
048600000000                      BY CONTENT LENGTH OF CUST-NAME,
048700000000                      BY REFERENCE AFP-CHARACTER-STRING,
048800000000                      AFP-STRING-LENGTH.
048900000000
049000000000      ADD 1 TO AFP-STRING-LENGTH.
049300000000      MOVE LEFT-ALIGN TO AFP-ALIGNMENT-OPTION.
049400000000      MOVE TRU TO AFP-POSITION-OPTION.
049500000000      PERFORM AFPWRITE.
049600000000
049700000000      *-----*
049800000000      * Write the customer address.                                *
049900000000      *-----*
050000000000      PERFORM AFPNLINE.
050100000000
050200000000      CALL "TRIM" USING CUST-ST-ADDR,
050300000000                      BY CONTENT LENGTH OF CUST-ST-ADDR,
050400000000                      BY REFERENCE AFP-CHARACTER-STRING,
050500000000                      AFP-STRING-LENGTH.
050600000000
050700000000      ADD 1 TO AFP-STRING-LENGTH.
051000000000      MOVE LEFT-ALIGN TO AFP-ALIGNMENT-OPTION.
051100000000      MOVE TRU TO AFP-POSITION-OPTION.
051200000000      PERFORM AFPWRITE.
051300000000
051400000000      PERFORM AFPNLINE.
051500000000
051600000000      CALL "TRIM" USING CUST-CITY-STATE,
051700000000                      BY CONTENT LENGTH OF CUST-CITY-STATE,
051800000000                      BY REFERENCE AFP-CHARACTER-STRING,
051900000000                      AFP-STRING-LENGTH.
052000000000
052100000000      ADD 1 TO AFP-STRING-LENGTH.
052300000000      MOVE LEFT-ALIGN TO AFP-ALIGNMENT-OPTION.
052400000000      MOVE TRU TO AFP-POSITION-OPTION.
052500000000      PERFORM AFPWRITE.
052600000000
052700000000      PERFORM AFPNLINE.
052800000000
052900000000      /-----*
053000000000      *-----*
053100000000      *
053200000000      * PROCESS TRANSACTIONS.                                *
053300000000      *
053400000000      *-----*
053500000000
053600000000      PROCESS-TRANSACTIONS.
053700000000          MOVE "NO " TO NEW-CUSTOMER.
053800000000          MOVE 5442 TO AFP-Y-COORDINATE.
053900000000      PERFORM AFPVMOVETO.
054000000000      PERFORM WRITE-TRANSACTIONS UNTIL
054100000000          NEW-CUSTOMER = "YES" OR DATA-REMAINS-SWITCH = "NO".
054200000000      PERFORM AFPNLINE.
054300000000          MOVE 793 TO AFP-X-COORDINATE.
054400000000          MOVE ABSOLUTE-POS TO AFP-X-REF-COORD-SYS.
054500000000      PERFORM AFPHMOVETO.
054600000000          SET AFP-RULE-HANDLE TO RULEHNDL1.
054700000000      PERFORM AFPERULE.
054800000000          MOVE 850 TO AFP-X-COORDINATE.

```

054900000000	PERFORM AFPHMOVE.
055000000000	SET AFP-RULE-HANDLE TO RULEHNDL2.
055100000000	PERFORM AFPERULE.
055200000000	MOVE 570 TO AFP-X-COORDINATE.
055300000000	PERFORM AFPHMOVE.
055400000000	SET AFP-RULE-HANDLE TO RULEHNDL3.
055500000000	PERFORM AFPERULE.
055600000000	MOVE 1427 TO AFP-X-COORDINATE.
055700000000	PERFORM AFPHMOVE.
055800000000	SET AFP-RULE-HANDLE TO RULEHNDL4.
055900000000	PERFORM AFPERULE.
056000000000	MOVE 4422 TO AFP-X-COORDINATE.
056100000000	PERFORM AFPHMOVE.
056200000000	SET AFP-RULE-HANDLE TO RULEHNDL5.
056300000000	PERFORM AFPERULE.
056400000000	MOVE 1247 TO AFP-X-COORDINATE.
056500000000	PERFORM AFPHMOVE.
056600000000	SET AFP-RULE-HANDLE TO RULEHNDL6.
056700000000	PERFORM AFPERULE.
056800000000	MOVE 1984 TO AFP-X-COORDINATE.
056900000000	PERFORM AFPHMOVE.
057000000000	SET AFP-RULE-HANDLE TO RULEHNDL7.
057100000000	PERFORM AFPERULE.
057200000000	MOVE 850 TO AFP-X-COORDINATE.
057300000000	MOVE ABSOLUTE-POS TO AFP-X-REF-COORD-SYS.
057400000000	PERFORM AFPHMOVETO.
057500000000	MOVE 10500 TO AFP-RULE-LENGTH.
057600000000	MOVE 10 TO AFP-RULE-THICKNESS.
057700000000	PERFORM AFPPHRUL.
057800000000	
057900000000	*-----*
058000000000	* If there is room, build a personalized paragraph. *
058100000000	*-----*
058200000000	PERFORM AFPQUERY.
058300960322	IF AFP-Y-COORDINATE < 8000
058400000000	
058500960322	MOVE 4040 TO AFP-PARA-WIDTH
058600960322	MOVE JUSTIFY-ALIGN TO AFP-FORMAT-OPTION
058700960322	MOVE DEFAULT-LSP TO AFP-LINE-SPACING
058800960322	MOVE 10000 TO AFP-PARA-MAXDEPTH
058900960322	PERFORM AFPBPARA
059000000000	
059100960322	MOVE LOW-VALUES TO AFP-CHARACTER-STRING
059200960322	STRING AFP-STRING-1
059300960322	DELIMITED BY SIZE INTO AFP-CHARACTER-STRING
059400960322	CALL "STRING-LENGTH" USING AFP-CHARACTER-STRING,
059500000000	BY CONTENT LENGTH OF AFP-CHARACTER-STRING,
059600960322	BY REFERENCE AFP-STRING-LENGTH
059700960322	ADD 1 TO AFP-STRING-LENGTH
060000960322	PERFORM AFPPTXT
060100000000	
060200960322	CALL "TRIM" USING CUST-NAME,
060300000000	BY CONTENT LENGTH OF CUST-NAME,
060400000000	BY REFERENCE AFP-CHARACTER-STRING,
060500960322	AFP-STRING-LENGTH
060600000000	
060700960322	ADD 1 TO AFP-STRING-LENGTH
061000960322	PERFORM AFPPTXT
061100000000	
061200960322	MOVE LOW-VALUES TO AFP-CHARACTER-STRING
061300960322	STRING AFP-STRING-2
061400960322	DELIMITED BY SIZE INTO AFP-CHARACTER-STRING
061500960322	CALL "STRING-LENGTH" USING AFP-CHARACTER-STRING,
061600960322	BY CONTENT LENGTH OF AFP-CHARACTER-STRING,
061700960322	BY REFERENCE AFP-STRING-LENGTH
061800960322	ADD 1 TO AFP-STRING-LENGTH
062100000000	

```

062200960322      PERFORM AFPPTTEXT
062300960322      PERFORM AFPEPARA
062400960322      END-IF.
062500000000
062600000000      *-----*
062700000000      * Write the transaction rows for this customer.      *
062800000000      *-----*
062900000000      WRITE-TRANSACTIONS.
063000000000          MOVE 1000 TO AFP-X-COORDINATE.
063100000000          PERFORM AFPHMOVETO.
063200000000          PERFORM AFPNLINE.
063300000000          PERFORM AFPQUERY.
063400000000
063500000000      *-----*
063600000000      *          This is where we check to see if we need another      *
063700000000      *          page.  if so, count it, and start a new one.      *
063800000000      *          don't end page until all done so we can print      *
063900000000      *          'page n of m' string .      *
064000000000      *-----*
064100000000          IF AFP-RET-CODE = 13 OR AFP-Y-COORDINATE > 11520
064200000000              PERFORM END-CUST-PAGE.
064300000000
064400000000          MOVE TRANS-QUANTITY TO AFP-CHARACTER-STRING.
064500000000          MOVE 4 TO AFP-STRING-LENGTH.
064700000000          MOVE LEFT-ALIGN TO AFP-ALIGNMENT-OPTION.
064800000000          MOVE TRU TO AFP-POSITION-OPTION.
064900000000          PERFORM AFPWRITE.
065000000000          MOVE 1000 TO AFP-X-COORDINATE.
065100000000          PERFORM AFPHMOVE.
065200000000
065300000000          MOVE TRANS-UOM TO AFP-CHARACTER-STRING.
065400000000          MOVE 2 TO AFP-STRING-LENGTH.
065600000000          MOVE CENTER-ALIGN TO AFP-ALIGNMENT-OPTION.
065700000000          MOVE TRU TO AFP-POSITION-OPTION.
065800000000          PERFORM AFPWRITE.
065900000000
066000000000          MOVE 417 TO AFP-X-COORDINATE.
066100000000          PERFORM AFPHMOVE.
066200000000
066300000000          MOVE TRANS-ITEMNUM TO AFP-CHARACTER-STRING.
066400000000          MOVE 8 TO AFP-STRING-LENGTH.
066600000000          MOVE LEFT-ALIGN TO AFP-ALIGNMENT-OPTION.
066700000000          MOVE TRU TO AFP-POSITION-OPTION.
066800000000          PERFORM AFPWRITE.
066900000000
067000000000          MOVE 1417 TO AFP-X-COORDINATE.
067100000000          PERFORM AFPHMOVE.
067200000000          MOVE TRANS-DESCRIPTION TO AFP-CHARACTER-STRING.
067300000000          MOVE 25 TO AFP-STRING-LENGTH.
067500000000          MOVE LEFT-ALIGN TO AFP-ALIGNMENT-OPTION.
067600000000          MOVE TRU TO AFP-POSITION-OPTION.
067700000000          PERFORM AFPWRITE.
067800000000
067900000000          MOVE 8390 TO AFP-X-COORDINATE.
068000000000          PERFORM AFPHMOVETO.
068100000000          MOVE TRANS-AMOUNT-IN TO TRANS-AMOUNT-OUT.
068200000000          MOVE TRANS-AMOUNT-OUT TO AFP-CHARACTER-STRING.
068300000000          MOVE 7 TO AFP-STRING-LENGTH.
068500000000          MOVE RIGHT-ALIGN TO AFP-ALIGNMENT-OPTION.
068600000000          MOVE TRU TO AFP-POSITION-OPTION.
068700000000          PERFORM AFPWRITE.
068800000000
068900000000          MOVE 1500 TO AFP-X-COORDINATE.
069000000000          PERFORM AFPHMOVE.
069100000000          MULTIPLY TRANS-QUANTITY BY TRANS-AMOUNT-IN GIVING
069200000000              EXTENSION-AMOUNT-COMP ROUNDED.
069300000000          MOVE EXTENSION-AMOUNT-COMP TO EXTENSION-AMOUNT-OUT.

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069400000000      MOVE EXTENSION-AMOUNT-OUT TO AFP-CHARACTER-STRING.
069500000000      MOVE 9 TO AFP-STRING-LENGTH.
069700000000      MOVE RIGHT-ALIGN TO AFP-ALIGNMENT-OPTION.
069800000000      MOVE TRU TO AFP-POSITION-OPTION.
069900000000      PERFORM AFPWRITE.
070000000000
070100000000      PERFORM READ-DATA.
070200000000
070300000000      *-----*
070400000000      *           This is for more than one page per customer.           *
070500000000      *-----*
070600000000      END-CUST-PAGE.
070700000000
070800000000      MOVE NUM-CUSTOMER-PAGES TO NUM-CUSTOMER-PAGES-OUT.
070900000000      MOVE NUM-CUSTOMER-PAGES-OUT TO AFP-PAGE-NAME.
071100000000      PERFORM AFPBPAGE.
071200000000
071300000000      PERFORM CREATE-THE-HEADER.
071400000000      ADD 1 TO NUM-CUSTOMER-PAGES.
071500000000
071600000000      *-----*
071700000000      *                                           *
071800000000      *   PROCESS THE FOOTER.                                           *
071900000000      *                                           *
072000000000      *-----*
072100000000
072200000000      CREATE-THE-FOOTER.
072300000000      *-----*
072400000000      *   Position below the tear strip.                               *
072500000000      *-----*
072600000000      MOVE 0 TO AFP-X-COORDINATE.
072700000000      MOVE ABSOLUTE-POS TO AFP-X-REF-COORD-SYS.
072800000000      MOVE 0 TO AFP-Y-COORDINATE.
072900000000      MOVE ABSOLUTE-POS TO AFP-Y-REF-COORD-SYS.
073000000000      PERFORM AFPSPPOS.
073100000000
073200000000      /-----*
073300000000      *-----*
073400000000      *                                           *
073500000000      *   TERMINATE THE AFPAPI AND THE PROGRAM                               *
073600000000      *                                           *
073700000000      *-----*
073800000000
073900000000      END-PROCESSING.
074000000000      PERFORM AFPEDOC.
074100000000      PERFORM APPEND.
074100000001      *****
074100000002      *                                           *
074200000000      *   Include the provided copy files that contains               *
074200000001      *   the AFP Toolbox subroutines                               *
074200000002      *                                           *
074200000003      *****
074300000000      COPY AOCLCBLP.
074400960322      COPY APQTRIM.
074500960322      COPY APQSTRL.
074600000000
074700000000      END PROGRAM SUNSEEDS.

```

Description of COBOL Program Listing

There are several important differences in the way this application can be done with the Toolbox. First, typographic fonts can be used, because the Toolbox enables text strings to be formatted in several alignments. Second, the boxes around the item transactions can be drawn to the exact size needed instead of always being a fixed size. Third, a personalized paragraph of text is included for each customer order.

Notice that the text in this paragraph is formatted and that the lines are flowed by Toolbox, so that the application program does not have to measure the strings of characters. Bar codes can be generated directly from your application. Finally, you can number pages “n of m” and make decisions from your application about when a page of text is full.

All Toolbox applications begin by initializing the session (as shown in line 016400000000). If the initialization call is successful, the next thing to do is begin a document. Lines 017200000000 through 018000000000 show how to specify the output file name and other information about the document for the output AFP data stream.

After the document is started, each page must be built (see lines 028300000000 and 028500000000). The application reads the customer data from an input file. The name and address are formatted at the top of the page, following the overlay which contains the Super Sun Seeds logo and other fixed text (see lines 030300000000 through 035300000000).

The Toolbox provides the capability to format text as left-, right-, center- or character-aligned strings. Left-aligned strings such as the customer name and address are shown in lines 048400000000 through 052700000000 of the sample. Right-aligned strings for the account and invoice numbers are shown in lines 038000000000 through 040300000000. Centered strings are shown in the UOM column (lines 065300000000 through 065800000000), and character-alignment is used for the Total Due field.

One of the most powerful functions provided by the Toolbox is the ability to produce formatted paragraphs of text. The personalized paragraph in the middle of the page is produced by the code shown in lines 057900000000 through 062400960322.

The variable size rules for the box are started in lines 032000000000 through 035300000000 and ended in lines 054300000000 through 057700000000.

Sample RPG Program using AFP Toolbox

The following is a sample of the source code of an RPG program that was created with AFP Toolbox. This sample code creates a paragraph of formatted text in 14-point Times New Roman font.

```

HDATAFMT(*USA)
*
FQSYSPRT 0 F 132 PRINTER OFLIND(*INOV)
*
D* These arrays hold constants used in the program
DWDS S 100A DIM(3) PERRCD(1) CTDATA
DDTA S 45A DIM(12) PERRCD(1) CTDATA
* Font ID's
D TIM14NAME S 5I 0
D TIM14TYPE S 5I 0
* Return code
D AFPRTNCD S 10I 0
*
D/COPY AOCLRPGH
*
* * * * *
*
* MAINLINE
*
* The mainline logic is as follows:

```

```

*
*           Set-up the API
*           Begin a Page
*           Set Position
*           Write a string of text in 14 point bold TNR
*           End the Page
*           End the API
*
* * * * *
*
C           EXSR      SETUPAPIR
*
C           DTA(1)    CAT(P)  x'00':0    AFPPAGNAM
* The above line places the DTA(1) data in AFPPAGNAM and adds a Hex'00' as
C           EXSR      AFPBPAGER
*
C           Z-ADD     1440      AFPXCRD
C           Z-ADD     1440      AFPYCRD
C           Z-ADD     ABSPOS     AFPXRFCRDS
C           Z-ADD     ABSPOS     AFPYRFCRDS
C           EXSR      AFPSPOSR
*
C           Z-ADD     TIM14TYPE   AFPFNTID
C           EXSR      AFPSFONTR
*
C           DTA(2)    CAT(P)  X'00':0    AFPCHRSTR
C           MOVE      LEFTALGN    AFPALNOPT
C           MOVE      FALS        AFPPSOPT
C           Z-ADD     -1          AFPXTRVAR
C           Z-ADD     -1          AFPXTRICS
C           MOVE      ' '         AFPALNCHR
C           EXSR      AFPWRITER
*
C           Z-ADD     1440      AFPYCRD
C           EXSR      AFPVMOVER
*
C           Z-ADD     20        AFPRULTHK
C           Z-ADD     4320      AFPBOXWID
C           EXSR      AFPBBOXR
*
C           EXSR      AFPNLINER
*
C           Z-ADD     140       AFPXCRD
C           EXSR      AFPHMOVER
*
C           Z-ADD     4040      AFPPARWTH
C           MOVE      JUSTFYALN  AFPFMTOPT
C           MOVE      DEFLLSP    AFPLINSPC
C           Z-ADD     10000     AFPPARMAX
C           EXSR      AFBPBARAR
*
C           WDS(1)    CAT(P)  WDS(2):0    AFPCHRSTR
C           CAT(P)    WDS(3):0    AFPCHRSTR
C           CAT(P)    X'00':0    AFPCHRSTR
C           EXSR      AFPPTXTR
*
C           EXSR      AFPEPARAR
*
C           Z-ADD     80        AFPYCRD
C           EXSR      AFPVMOVER
*
C           Z-ADD     1440      AFPXCRD
C           EXSR      AFPHMOVTOR
*
C           EXSR      AFPEBOXR
*
C           EXSR      AFPEPAGER

```

```

*
C          EXSR      AFPEDOCR
C          EXSR      AFPENDR
*
C      FINIS      TAG
C          SETON
LR
*
* * * * *
*      Subroutines for AFP Toolbox
* * * * *
C/COPY AOCLRPGS
* * * * *
*      Set Up the API
*      Initialize the AFP API
*      Set the output characteristics
*      Begin a document
*      Define the fonts
*
C      SETUPAPIR      BEGSR
C          EXSR      AFPINTR
*
*      Set the output characteristics
C      DTA(3)      CAT(P)      x'00':0      AFPDOCNAM
C      DTA(4)      CAT(P)      x'00':0      AFPDOCCMT
C          Z-ADD      FILED      AFPOUTTYP
C      DTA(5)      CAT(P)      x'00':0      AFPOUTFLE
C          EXSR      AFPBDOCR
*
*      Define the fonts
C      DTA(6)      CAT(P)      x'00':0      AFPDESNAM
C      DTA(7)      CAT(P)      x'00':0      AFPCDEPAG
C          Z-ADD      140      AFPPNTSIZ
C          Z-ADD      MEDIUM      AFPWGT
C          Z-ADD      NORMAL      AFPFNTWTH
C          Z-ADD      ROMAN      AFPSTL
C          EXSR      AFPDFNTATR
*
C          Z-ADD      AFPFNTID      TIM14TYPE
C*      DTA(8)      CAT(P)      x'00':0      AFPCHRSET
C*          EXSR      AFPDFNTNMR
C*          Z-ADD      AFPFNTID      TIM14NAME
*
C          ENDSR
*
QSYS SPRT      E          ERROUT      1 5
0          AFPERRDTA      27
0          27 'FAILED'
0          47 'Toolbox Return Code'
0          AFPRTNCD      52
*
**CTDATA WDS
The Toolbox allows you to produce customized output pages that utilize typograph
ic fonts, shading, graphics, and image. You can focus your customer's attention
on important information that might be overlooked.
**CTDATA DTA
Page 1 of Many      1
HELLO WORLD      2
RPG TEST DOC      3
And a comment      4
/QSYS.LIB/MYLIB.LIB/AFPOUT.FILE/RPGTEST.MBR      5
TIMES NEW ROMAN LATIN1      6
T1V10500      7
C0N20000      8

```

Appendix N. Where to Find Additional Information

The following publications contain additional information about AFP printing with PSF/400. The titles and order numbers for publications can change from time to time. To verify the current title or order number for a publication, contact your IBM representative.

You can use any of the following methods to send comments about the publications:

- Reader's Comment form in each publication
- IBM Mail Exchange id: IEA USIB4TDB
- FAX number: 1-800-524-1519

IBM AFP PrintSuite for AS/400

Table 40. IBM AFP PrintSuite for AS/400 Publications

Publication	Order Number
<i>Advanced Print Utility User's Guide</i>	S544-5351
<i>IBM Page Printer Formatting Aid: User's Guide and Reference</i>	S544-5284
<i>IBM Advanced Function Presentation Toolbox for Multiple Operating Systems</i>	S544-5292
<i>SAP/R3 AFP: Printing on the AS/400</i>	S544-5412

AS/400

Table 41. AS/400 Publications

Publication	Order Number
<i>AS/400 Printer Device Programming</i>	SC41-5713
<i>AS/400 Data Description Specifications Reference</i>	SC41-371
<i>Advanced Function Printing Utilities for AS/400, User's Guide</i>	S544-5349
<i>AS/400 Command Language Reference</i>	SC41-5722
<i>IBM AS/400 Printing II</i>	GG24-3704
<i>IBM AS/400 Printing III</i>	GG24-4028
<i>IBM AS/400 Printing IV</i>	GG24-4389
<i>IBM AS/400 Printing V</i>	SG24-2160

OS/400

Table 42. OS/400 Publications

Publication	Order Number
<i>System API Reference</i>	SC41-3801
<i>PrintManager API Reference</i>	S544-3699
<i>System API Programming</i>	SC41-3800

GDDM

Table 43. GDDM Publications

Publication	Order Number
<i>GDDM Programming Guide</i>	SC41-0536
<i>GDDM Programming Reference</i>	SC41-0537
<i>GDDM Programming</i>	SC41-3717
<i>GDDM Reference</i>	SC41-3718

Business Graphics Utility

Table 44. Business Graphics Utility Publications

Publication	Order Number
<i>LPS: AS/400 Business Graphics Utility</i>	GC09-1786
<i>BGU User's Guide and Reference</i>	SC09-1408

Report Layout Utility

Table 45. Report Layout Utility Publications

Publication	Order Number
<i>RLU User's Guide and Reference</i>	SC09-1416
<i>ADTS/400: Report Layout Utility</i>	SC09-1767

OfficeVision/400

Table 46. OfficeVision/400 Publications

Publication	Order Number
<i>LPS: OfficeVision/400</i>	GH21-0791
<i>Learning about OfficeVision/400</i>	SC41-9615
<i>Using OfficeVision/400</i>	SH21-0697
<i>Learning about OfficeVision/400 Word Processing</i>	SC41-9617
<i>Using OfficeVision/400 Word Processing</i>	SH21-0701
<i>Planning for and Setting Up OfficeVision/400</i>	SH21-0695
<i>Managing OfficeVision/400</i>	SH21-0699
<i>Office Services Concepts and Programmer's Guide</i>	SH21-0703
<i>OfficeVision/400 Common Tasks</i>	SH21-0698
<i>OfficeVision/400 Word Processing Quick Reference Card</i>	SX20-0243
<i>Setting Up and Printing in an OfficeVision/400 Environment</i>	SH21-0511
<i>Getting Started with OfficeVision/400</i>	SH21-0732

Client Access/400

Table 47. Client Access/400 Publications

Publication	Order Number
<i>LPS: Client Access/400 Family</i>	GC41-3052
<i>Client Access/400 for DOS and OS/2 Technical Reference</i>	SC41-3563
<i>Client Access/400 for Windows 3.1 - Getting Started</i>	SC41-3530
<i>Client Access/400 for Windows 3.1 API and Technical Reference</i>	SC41-3531
<i>Client Access/400 for OS/2 Setup</i>	SC41-3520
<i>Client Access/400 for OS/2 User Guide</i>	SC41-3521
<i>Client Access/400 for OS/2 Setup (DBCS)</i>	SC41-3522
<i>Client Access/400 for OS/2 User Guide (DBCS)</i>	SC41-3523

Facsimile Support for AS/400

Table 48. Facsimile Support for AS/400 Publications

Publication	Order Number
<i>Facsimile Support for AS/400 Programmer's Guide</i>	SC41-0656
<i>Facsimile Support for AS/400 Installation Guide</i>	SC41-0654
<i>Facsimile Support for AS/400 User's Guide</i>	SC41-0655

Advanced Function Presentation and API

Table 49. Advanced Function Presentation Publications

Publication	Order Number
<i>Printing and Publishing Collection Kit</i>	SK2T-2921
<i>Guide to Advanced Function Presentation</i>	G544-3876
<i>Advanced Function Presentation: Printer Summary</i>	G544-3135
<i>Advanced Function Presentation: Printer Information</i>	G544-3290
<i>AFP Conversion and Indexing Facility: Application Programming Guide</i>	G544-3824
<i>Advanced Function Presentation: Programming Guide and Line Data Reference</i>	S544-3884
<i>AFP Migration Aids for 3200 User's Guide (Japanese language version)</i>	N:SC18-0835
<i>Introduction to Advanced Function Printing (Japanese language version)</i>	N:GG18-9126
<i>AFP Guide for Application Programmers (Japanese language version)</i>	N:ZR18-8920

Data Stream and Object Architectures

Table 50. Data Stream and Object Architectures Publications

Publication	Order Number
<i>Mixed Object Document Content Architecture Reference</i>	SC31-6802
<i>Intelligent Printer Data Stream Reference</i>	S544-3417
<i>Bar Code Object Content Architecture Reference</i>	S544-3766
<i>Font Object Content Architecture Reference</i>	S544-3285
<i>Presentation Text Object Content Architecture Reference</i>	SC31-6803
<i>Graphics Object Content Architecture Reference</i>	SC31-6804
<i>Image Object Content Architecture Reference</i>	SC31-6805

IBM AFP Font Collection

Table 51. IBM AFP Fonts Publications

Publication	Order Number
<i>IBM AFP Fonts: Font Summary for IBM AFP Font Collection</i>	S544-5633
<i>IBM AFP Fonts: Font Summary</i>	G544-3810
<i>IBM AFP Fonts: Font Samples</i>	S544-3792
<i>IBM AFP Fonts: Type Transformer User's Guide</i>	G544-3796
<i>IBM AFP Fonts: Introduction to Typography</i>	G544-3122
<i>IBM AFP Fonts: Technical Reference for IBM Expanded Core Fonts</i>	S544-5228
<i>IBM AFP Fonts: Technical Reference for Code Pages</i>	S544-3802
ABOUT TYPE: IBM's Technical Reference for 240-Pel Digitized Type	A544-3516
IBM AFP Fonts: Technical Reference for IBM Chinese, Japanese, and Korean Fonts	S544-5330

Additional Font Catalogs

Table 52. Additional Font Catalogs

Publication	Order Number
<i>AFP Japanese Font Catalog</i>	N:SC18-2332
<i>AFP Simplified Chinese Font Catalog</i>	N:SC18-0133
<i>AFP Traditional Chinese Font Catalog</i>	N:SC18-0124
<i>AFP Korean Font Catalog</i>	N:SB09-1421
<i>AFP Thai Font Catalog</i>	N:SC18-0137

Glossary

Source Identifiers

This publication includes terms and definitions from the *IBM Dictionary of Computing*, SC20-1699.

Definitions reprinted from the *American National Dictionary for Information Processing Systems* are identified by the symbol (A) following the definition.

Definitions reprinted from a published section of the International Organization for Standardization's *Vocabulary—Information Processing* or from a published section of the ISO *Vocabulary—Office Machines* are identified by the symbol (I) following the definition. Because many ISO definitions are also reproduced in the *American National Dictionary for Information Processing Systems*, ISO definitions may also be identified by the symbol (A).

Definitions reprinted from working documents, draft proposals, or draft international standards of ISO Technical Committee 97, Subcommittee 1 (Vocabulary) are identified by the symbol (T) following the definition, indicating that final agreement has not yet been reached among its participating members.

Definitions that are specific to IBM products are so labeled, for example, "In SNA," or "In the 3820."

References

The following cross-references are used in this glossary:

Contrast with. This refers to a term that has an opposite or substantively different meaning.

See. This refers the reader to multiple-word terms in which this term appears.

See also. This refers the reader to terms that have related, but not synonymous, meanings.

Synonym for. This appears in the commentary of a less desirable or less specific term and identifies the preferred term that has the same meaning.

Synonymous with. This appears in the commentary of a preferred term and identifies less desirable or less specific terms that have the same meaning.

A

ACIF. AFP Conversion and Indexing Facility

addressable point. Any point in a presentation surface that can be identified by a coordinate from the coordinate system of the presentation medium. See also pel.

Advanced Function Presentation (AFP). A set of licensed programs that use the all-points-addressable concept to print data on a wide variety of printers or display data on a variety of display devices. AFP also includes creating, formatting, archiving, viewing, retrieving, and distributing information.

Advanced Function Presentation Application Programming Interface. An AFP program shipped with PSF/MVS 2.1.1 and later and PSF/VM 2.1.1 that creates the AFP data stream from the COBOL and PL/1 high-level programming languages.

Advanced Function Presentation data stream. A presentation data stream that is processed in the AFP environment. MO:DCA-P is the strategic AFP interchange data stream. IPDS is the strategic AFP printer data stream.

Advanced Function Printing Utilities for AS/400 (AFP Utilities). An IBM licensed program that includes a group of utilities that work together to provide Advanced Function Printing on the AS/400.

Advanced Print Utility (APU). Part of the AFP PrintSuite family of application enablers that allow end-users to migrate existing application output to advanced electronic documents.

AFP. Advanced Function Presentation.

AFP API. Advanced Function Presentation Application Programming Interface

AFP Conversion and Indexing Facility. An AFP program you can use to convert a print file into a MO:DCA-P document, to retrieve resources used by the document, and to index the file for later retrieval and viewing.

AFPDS. A synonym for the composed page, MO:DCA-P-based data stream interchanged in AFP environments.

AFP Utilities for AS/400 (AFP Utilities). Advanced Function Printing Utilities for AS/400.

AFP Workbench for OS/2 and Windows. A platform for the integration of AFP enabling applications and services. The Viewer application is a Workbench tool.

The Windows version runs under WIN-OS/2 or Microsoft Windows. The OS/2 version runs under OS/2.

all-points addressable (APA). The capability to address, reference, and position text, overlays, and images at any defined point (pel) on the printable area of the paper. See page mode.

American National Standard Code for Information Interchange. A standard code, using a coded character set consisting of 7-bit coded characters (8-bits, including the parity check), that is used for information interchange among data processing systems, data communication systems, and their associated equipment. The ASCII set consists of control characters and graphic characters.

APA. All points addressable.

APA printers. Devices that are all points addressable; in other words, devices that print with picture elements on the printing medium at any valid location on a sheet of paper.

APPC. Advanced program-to-program communication. APPC is the implementation of the SNA LU session type 6.2 architecture.

application program. A program written for or by a user that applies to the user's work, such as a program that does inventory control or payroll.

application programmer. A programmer who is responsible for writing programs for specific applications. The application programmer takes application data and writes programs to print it on line and AFP printers.

Application System/400. The hardware on which the OS/400 operating system runs.

APU. Advanced Print Utility

APU Monitor. A program that, when processed, applies print definitions to selected spooled files so that the spooled files are automatically converted to AFP print files.

architecture. The set of rules and conventions that govern the creation and control of data types such as text, image, graphics, font, fax, color, audio, bar code, and multimedia.

ASCII. American National Standard Code for Information Interchange

AS/400. Application System/400.

B

bar code. A code representing characters by sets of parallel bars of varying thickness and separation that are read optically by transverse scanning. (I)

baseline. In a font, the imaginary line on which successive characters are aligned in the inline direction.

batch. (1) A group of records or data processing jobs brought together for processing or transmission. (2) Pertaining to activity involving little or no user action. Contrast with interactive.

batch environment. The environment in which noninteractive programs are executed. The environment schedules their execution independently of their submitter. Contrast with interactive environment.

burst. To separate continuous-form paper into separate sheets.

C

character. (1) A symbol used in printing. For example, a letter of the alphabet, a numeral, a punctuation mark or any other symbol that represents information. (2) A byte of data.

character graphic. The visual representation of a character, defined by toned or untoned picture elements (pels). **Note:** An untoned pel (a reverse character) is visually represented by the toned pels around it.

character increment. The distance the current print position is increased by printing the current character graphic.

character rotation. The alignment of a character relative to the baseline, measured in degrees in a clockwise direction. Examples are 0°, 90°, 180°, and 270°.

code page. A font component that associates code points and character identifiers. A code page also identifies how undefined code points are handled.

code point. A 1-byte code representing one of 256 potential characters.

command. A request from a terminal or a specification in a batch processing job for the performance of an operation or the execution of a particular program.

composition. The act or result of formatting a document.

conditional processing. A page definition function that enables input data records to partially control their own formatting.

constant data. (1) Data with a value that does not change. (2) Data that has an unchanging, predefined value to be used in processing. A constant does not change during execution of a program, but the contents of a field or variable can. Contrast with variable data.

continuous-forms paper. A series of connected forms that feed continuously through a printer. The connection

between the sheets is perforated to enable the user to tear them apart. Before printing, the sheets are folded in a stacked arrangement, with the folds along the perforations. (Note that some continuous forms are in rolls and are not folded.) Contrast with cut-sheet paper.

copy. The specification level of an APU print definition where most layout work, such as specifying page layout options, selecting and placing images, and defining constants and boxes, is done.

cut-sheet paper. Paper that is cut into separate sheets before being printed on. Contrast with continuous-forms paper.

D

data base. A set of data, part or the whole of another set of data that consists of at least one file, and that is sufficient for a given purpose or for a given data-processing system. (I) (A)

data processing. The systematic performance of operations upon data; for example, handling, merging, sorting, and computing. (I) (A)

data set. Synonym for file.

data stream. (1) All data transmitted through a data channel in a single read or write operation. (2) A continuous stream of data elements being transmitted, or intended for transmission, in character or binary-digit form, using a defined format. (3) Records sent to PSF from the print files and the resource libraries.

DBCS. Double-byte character set.

direction. The print position of data on a logical page, line, or field. The ultimate reference point for all direction controls on a page is the hardware origin. Secondary and tertiary reference points are possible as well, enabling more than one print direction on a page.

ditroff. A file format consisting of device-independent data produced by the troff utility. See troff.

document. (1) A publication or other written material pertaining to a specific subject or related subjects. (2) In word processing, a collection of one or more lines of text that can be named and stored as a separate entity.

duplex printing. Pertaining to printing on both sides of a sheet of paper. Contrast with simplex printing.

E

electronic overlay. Synonym for overlay.

end user. (1) A person, device, program, or computer system that uses a computer network for the purpose of data processing and information exchange. (T) (2) A person who writes and creates documents. The end

user has little or no programming training but knows how to use a terminal for text processing. Examples of end users include secretaries, writers, and engineers.

external formatting. Controls for the placement of data on the page that are imbedded outside the actual application program.

F

field. In a record, a specified area used for a particular class of data; for example, a group of character positions used to enter or display wage rates on a screen. (T)

file. (1) A named set of records stored or processed as a unit. (T) (2) The major unit of data storage and retrieval, consisting of a collection of data in one of several prescribed arrangements and described by control information to which the operating system has access.

font. A family or assortment of characters of a given size and style; for example, 9-point Sonoran Serif roman medium. (A)

font administrator. A person who is responsible for installing and maintaining the fonts stored in computer resource libraries.

font metrics. Measurement information that defines individual character values such as height, width, and space as well as overall font values such as the average and maximum heights and widths of characters. Font metrics can be expressed in specified fixed units, such as pels, or in relative units that are independent of both the resolution and size of the font.

form. (1) The paper on which output data is printed by a line printer or a page printer. (2) A physical sheet of paper. See preprinted form.

form definition. A resource that defines the characteristics of the form which include overlays to be used (if any), text suppression, the position of page data on the form, and the number and modifications of a page. Contrast with page definition.

format. (1) A specified arrangement of such things as characters, fields, and lines, usually used for displays, printouts, or files. (2) To arrange such things as characters, fields, and lines. (3) (v.) To prepare a document for printing in a specified format.

formatter. A computer program that prepares a source document for printing.

forms designer. A person who is responsible for designing electronic or preprinted forms that are readable, usable, and attractive. The forms designer usually has training in graphics design and in the presentation of information.

ftp. File transfer protocol.

G

GDDM. Graphical Data Display Manager.

graphic. Image, text, or a combination of both that can be placed on the printed page.

Graphical Data Display Manager (GDDM). An IBM licensed program containing utilities for creating, saving, editing, and displaying visual data such as page segments, charts, images, vector graphics, composites (of text, graphics, and images), and scanned data.

graphics designer. A person who is responsible for the design and appearance of graphics used in a company's documents. The graphics designer has experience in graphics design as well as in using computers to create graphics.

H

hardware. Physical equipment as opposed to programs, procedures, rules, and associated documentation. (I) (A) Contrast with software.

host-based computer. (1) In a computer network, a computer that provides end users with services such as computation and data bases and that usually performs network control functions. (T) (2) The primary or controlling computer in a multiple-computer installation.

I

image. A pattern of toned and untoned pels that form a picture.

impact printer. A device in which printing results from mechanical impacts. (I) (A) Contrast with nonimpact printer.

index. (1) A process of segmenting a print file into uniquely identifiable groups of pages (a named collection of sequential pages) for later retrieval. (2) A process of matching reference points within a file and creating structured field tags within the MO:DCA-P document and the separate index object file.

index object file. An index-information file created by Advanced Function Presentation Conversion and Indexing Facility that contains Index Element (IEL) structured fields, which identify the location of the tagged groups in the AFP file. The indexing tags are contained in the Tagged Logical Element (TLE) structured fields.

Intelligent Print Data Stream (IPDS). A host-to-host printer data stream for Advanced Function Printing subsystems. It provides an interface to all-points-addressable printers that makes possible the

presentation of pages containing an architecturally unlimited mixture of different data types.

interactive. Pertaining to an application in which entries call forth a response from a system or program, as in an inquiry system. An interactive system might also be conversational, implying a continuous dialog between the user and the system. Interactive systems are usually communicated with through terminals, and respond immediately to commands.

interactive environment. An environment in which a terminal user interacts with the system. Contrast with batch environment.

IPDS. Intelligent Print Data Stream.

L

LAN. Local area network

LAN administrator. A person responsible for installing, configuring, and maintaining Local Area Networks on which are installed workstations and printers.

library. A file or a set of related files; for example, a page definition library containing one or more page definition files.

licensed program. A utility that performs a function for the user and usually interacts with and relies upon system control programming or some other IBM-provided control program. A licensed program contains logic related to the user's data and is usable or adaptable to meet specific requirements.

line data. Data prepared for printing on a line printer such as an IBM 3800 Model 1 Printing Subsystem. Line data is usually characterized by carriage-control characters and table reference characters. Contrast with MO:DCA-P data.

line-data print file. A file that consists of line data, optionally supplemented by a limited set of structured fields.

line printer. A device that prints a line of characters as a unit. (I) (A) Contrast with page printer.

lines per inch (lpi). (1) A unit of measurement for the specification of baseline placement. (2) A measure of the number of lines per vertical inch of paper.

local area network. A data network located on the user's premises in which serial transmission is used for direct data communication among data stations. (T)

logical page. A presentation space. One or more object areas or data blocks can be mapped to a logical page. A logical page has specifiable characteristics, such as size, shape, orientation, and offset and is rectangular in shape. Orientation and offset are specified relative to a medium coordinate system.

lowercase. Pertaining to small letters, as distinguished from capitals; for example, a, b, g, rather than A, B, G.

lpi. Lines per inch.

M

magnetic ink character recognition (MICR).

Recognition of characters printed with ink that contains particles of a magnetic material.

metafile format. OS/2 graphics data produced by Presentation Manager applications such as IBM CAD, CorelDRAW, or Aldus Pagemaker.

MICR. Magnetic ink character recognition.

Mixed Object Document Content Architecture. A strategic, architected, device-independent data stream for interchanging documents.

mixed-pitch font. A font that simulates a proportionally spaced font. The characters are in a limited set of pitches (for example, 10 pitch, 12 pitch, and 15 pitch).

MO:DCA-P. Mixed Object Document Content Architecture

monospaced font. A font in which the graphic characters have a uniform character increment. Synonymous with uniformly spaced font. Contrast with proportionally spaced font.

multiple-up printing. The printing of more than one page on a single surface of a sheet of paper.

N

nonimpact printer. A device in which printing is not the result of mechanical impacts; for example, thermal printers, electrostatic printers, photographic printers. (I) (A) Contrast with impact printer.

O

object format. The format of AFP resources required for use by PSF. Contrast with source format.

offset stacking. A function that enables the printed output pages to be offset for easy separation of the print jobs.

OGL/370. Overlay Generation Language/370.

OnDemand for AS/400. An IBM licensed program that enables you to archive, retrieve, view, and print AFP documents. This application features a graphical user interface.

Operating System/2 (OS/2). An IBM licensed program that can be used as the operating system for the PS/2 processor series.

Operating System/400 (OS/400). An IBM licensed program that can be used as the operating system for the AS/400 processor series.

orientation. (1) The angle between the top or bottom edge of the page and the baselines within a column, measured in a clockwise direction. (2) The rotation of an element relative to a fixed reference.

OS/2. Operating System/2.

OS/400. Operating System/400.

outline font. A font whose graphic character shapes are defined mathematically rather than by raster patterns.

output device. A machine used to print, display, or store the result of data processing.

overlay. A resource that can contain text, image, graphics, and bar code data. An overlay is electronically created in the host processor, stored in a library, and can be merged electronically with variable data on a sheet during printing. See also preprinted form and forms flash.

Overlay Generation Language/370 (OGL/370). An IBM licensed program used to create overlays.

P

page. A collection of data that can be printed on a physical sheet of paper.

page definition. A resource containing a set of formatting controls for printing logical pages of data. Includes controls for number of lines per printed sheet, font selection, print direction, and mapping individual fields in the data to positions on the printed sheets.

page format. (1) A subset of a page definition, containing controls governing the arrangement of text on a page. (2) In APU, the object that contains all of the instructions for formatting a print job. A print definition can name one or more page formats.

page mode. The mode of operation in which the printer can accept a page of data at a time from a host processor to be printed on an all-points addressable output device. Data may consist of pages composed of text, images, overlays, or page segments.

page printer. Any of a class of printers that accepts MO:DCA-P pages, constructed of composed text and images, among other things. Contrast with line printer.

Page Printer Formatting Aid. An IBM licensed program that you can use to create and store form definitions and page definitions.

page segment. A resource containing composed text and images, prepared before formatting and included during printing.

pel. The smallest area that can be individually toned on a printing medium or on a display surface.

pel density. The number of pels per unit of linear measurement.

personal computer. A desktop, floor-standing, or portable microcomputer that usually consists of a system unit, a display monitor, a keyboard, one or more diskette drives, internal fixed-disk storage, and an optional printer. Personal computers are designed primarily to give independent computing power to a single user or small businesses. **Note:** Personal computers are designed primarily for stand-alone operation but can be connected to mainframes or networks.

PFU. Print Format Utility.

physical page. The side of a sheet of paper that is to be printed on.

pica. A unit of about 1/6 inch used in measuring typographical material.

picture element. An element of a raster pattern about which a toned area on the photoconductor might appear. See also raster pattern. Synonym for pel.

pitch. A unit of measurement for the width of a printed character, reflecting the number of times a graphic character can be set in 1 linear inch; for example, 10-pitch has 10 graphic characters per inch. Uniformly spaced fonts are measured in pitch. Contrast with point.

plotter. An output unit that presents data in the form of a two-dimensional graphic representation. (I) (A)

point. In printing, a unit of about 1/72 of an inch used in measuring typographical material. Each pica contains 12 points.

point size. The height of a font in points.

postprocessing option. A hardware device that attaches to the output side of a printer; for example, an envelope stuffer, binder, or stapler.

PostScript. A page description language with interactive graphics capabilities that was developed by Adobe Systems, Incorporated.

PPDS. Page Printer Data Stream.

PPFA. Page Printer Formatting Aid.

preprinted form. A sheet of paper containing a preprinted design of constant data. Variable data can be merged on such a form.

preprocessing option. A hardware device that attaches to the input side of a printer; for example, a paper-roll feed or multiple input bins.

print data set. Synonym for print file.

print definition. Contains instructions for transforming simple SCS print output to advanced AFP output. A print definition includes the specifications for remapping existing print data, defining and creating different page formats and copies, and adding document elements such as overlays, images, fonts, bar codes, and constants.

print file. A file created by an application program that contains the actual information to be printed and some of the data that controls the format of the printing. Print files can contain MO:DCA-P data, line data, or a combination of MO:DCA-P and line data.

Print Format Utility (PFU). Part of the Advanced Function Printing Utilities for AS/400. This utility enables you to print data from database file members in various forms, such as text or bar codes.

print job. The data to be printed that is submitted to Print Services Facility by the user.

Print Services Facility (PSF). An IBM licensed program that produces printer commands from the data sent to it.

printer driver. A program that passes commands and resources with a data stream from the system spool to tell the printer how to print the page.

proportionally spaced font. A font in which the characters have different character increments. Graphic character widths vary with the size of each graphic character. This allows for even spacing between printed characters and eliminates excess space around narrow characters, such as the letter i. Contrast with uniformly spaced font.

PSF. Print Services Facility.

R

raster font. (1) A font created by a series of pels (picture elements) arranged in scan lines to form an image. (2) A font in which the characters are defined directly by the raster bit map.

raster graphics. Computer graphics in which a display image is composed of an array of picture elements (pels) arranged in rows and columns. (I) (A) Contrast with vector graphics.

raster pattern. A series of picture elements (pels) in scan lines to form an image. See also page segment.

record. A collection of related data or words, treated as a unit; for example, in stock control, each invoice could constitute one record.

remote printer. A device that prints in a location away from the centralized data processing center.

resource. A collection of printing instructions and sometimes data to be printed consisting entirely of structured fields. A resource can be stored as a member of a library and can be called for by Print Services Facility when needed. Coded fonts, font character sets, code pages, page segments, overlays, form definitions, and page definitions are all resources.

resource library. (1) A collection of related files. (2) A place to store resources such as form definitions, page definitions, page segments, fonts, and overlays.

rotation. The number of degrees a character is rotated relative to the print direction. One of four directions that define the orientation of text relative to a sheet, page, overlay, text block, or page segment.

S

scanner. A device that examines a spatial pattern one part after another and generates analog or digital signals corresponding to the pattern. Scanners are often used in mark sensing, pattern recognition, or character recognition. (I) (A)

SCS. See SNA character string (SCS)

segment. See page segment.

simplex printing. Printing on only one side of the paper. Contrast with duplex printing.

SNA. Systems Network Architecture (SNA)

SNA character string (SCS). In SNA, a data stream composed of EBCDIC controls, optionally intermixed with end-user data, that is carried within a request/response unit.

software. Programs, procedures, rules, and any associated documentation pertaining to the operation of a system. (T) (A) Contrast with hardware.

source format. The format of an AFP resource, other than fonts, used by AFP resource management programs. Contrast with object format.

spooling (simultaneous peripheral operation online). (1) The use of auxiliary storage as a buffer storage to reduce processing delays when transferring data between peripheral equipment and the processors of a computer. (I) (A) (2) The reading of input data streams and the writing of output data streams on

auxiliary storage devices, concurrently with job execution, in a format convenient for later processing or output operations.

structured field. A self-identifying, variable-length record, which can have a content portion that provides control information, data, or both.

syntax. The rules and keywords that govern the use of a programming language.

system printer. The printer used for any printed output that is not specifically directed to another printer.

system programmer. A programmer who is responsible for writing programs for the functions of the computer operating system and who has a thorough knowledge of the operating system. The system programmer installs and maintains AFP software in the System/390 environment.

Systems Network Architecture (SNA). In IBM networks, the description of the layered logical structure, formats, protocols, and operational sequences that are used for transmitting information units through networks, as well as controlling the configuration and operation of networks.

T

TCP/IP. Transmission Control Protocol/Internet Protocol

terminal. A device, usually equipped with a keyboard and some kind of display, capable of sending and receiving information over a communication channel.

text. A graphic representation of information on an output medium. Text consists of alphanumeric characters and symbols arranged in paragraphs, tables, columns, or other shapes.

text-formatting program. A program that determines the manner in which data will be placed on a page.

text orientation. A description of the appearance of text as a combination of inline and baseline directions and character rotation.

Transmission Control Protocol/Internet Protocol (TCP/IP). A set of communications protocols that support peer-to-peer connectivity functions for both local and wide area networks.

troff. A phototypesetting utility originally designed to support a Graphics Systems phototypesetting machine but that is now capable of supporting a variety of phototypesetters. The utility produces data in a format called ditroff.

type family. A collection of fonts of a common typeface that vary in size and style.

type font. Type of a given size and style; for example, 10-point Sonoran Serif roman medium. (A)

typeface. A collection of fonts all having the same style, weight, and width; each font differs from the others by point size or type family.

typeset. (1) To arrange the type on a page for printing.
(2) Pertaining to material that has been set in type.

typographic font. A typeface originally designed for typesetting systems. Contrast with mixed-pitch font, uniformly spaced font. Synonym for proportionally spaced font.

U

underscore. A line printed under a character. To underline.

uniformly spaced font. A font in which the characters have the same character increment. Synonymous with monospaced fonts. Contrast with proportionally spaced font and typographic font.

uppercase. Pertaining to capital letters, as distinguished from small letters; for example, A, B, G, rather than a, b, g.

V

variable data. (1) In programming languages, a language object that may take different values, one at a time. The values of a variable are usually restricted to a certain data type. (I) (2) A quantity that can assume any of a given set of values. (A) (3) Used to represent a data item whose value can be changed while the program is running. Contrast with constant data.

vector. In computer graphics, a directed line segment.

vector graphics. Computer graphics in which display images are generated from display commands and coordinate data. (I) (A) Contrast with raster graphics.

W

word processing. The entry, modification, formatting, display, and printing of text on personal computers, microprocessors, and stand-alone word processors.

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AS/400

AS/400 Guide to

**Advanced Function Presentation and
Print Services Facility**

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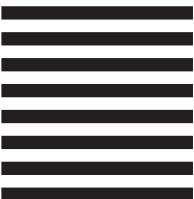
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